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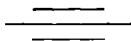
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UNIVERSITY OF NEW MEXICO PUBLICATIONS
IN ANTHROPOLOGY

NUMBER FOUR



A COMPARATIVE RACIAL
STUDY OF THE
PAPAGO

NORMAN E. GABEL



THE UNIVERSITY OF NEW MEXICO PRESS

ALBUQUERQUE : 1949

UNIVERSITY OF NEW MEXICO PUBLICATIONS

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A COMPARATIVE RACIAL STUDY OF THE PAPAGO

INTRODUCTION

THE PROBLEM

This paper presents a body of physical data on the Papago Indians and several other tribes of the Southwest. The Papago material is the result of a physical survey which the writer conducted in 1938. Most of the comparative material results from the work of Dr. Carl Seltzer on the Zuñi, Yaqui, Hopi, and Navaho. The bulk of Seltzer's Southwestern data is unpublished and presented here for the first time with permission of the author.

Nearly all of the men who comprise the Papago series were in the employ of the Indian Division of the Civilian Conservation Corps. The work of the CCC included the fencing of grazing areas, construction of irrigation aids, road building and repairs. These projects were scattered throughout the reservation. The Indian labor for these works was drawn from all parts of the Papago habitat; consequently, the survey is not biased by local geographical factors and the sample is probably a fair cross section of the adult male population.

The objectives of this paper are several. The first goal is a description, by means of standardized anthropometric devices,¹ of the Papago Indians. Secondly, comparisons will be attempted between the Papago and other Southwestern tribes about whom there are adequate data. This should result in a fairly accurate impression of the physical status of the Papago tribe and should gauge, to some extent, the physical relationships between the Papago and several other Southwestern groups. Finally, some of the information will bear on more general problems and certain of the broader racial questions

¹ The Harvard University anthropometric forms were used.

will be reëxamined with the view of confirming or qualifying some of them.

PHYSICAL STATUS OF THE AMERICAN INDIAN

There is little dispute over the numerous Mongoloid affinities exhibited by the modern American Indian. Hooton, in summarizing those Indian characteristics which show relatively little variability, has pointed out that the most clear-cut resemblances are with the Mongoloid stock.² Thus the Indian range in pigmentation, like the Mongoloid, is between the White and Negroid. Straight, coarse head hair is likewise the common attribute of Indians and Mongolians and the same can be said for malar size and projection, alveolar prognathism and greater face breadth. But there are also a number of Indian traits which are quite variable. Stature and body build are among these, and less conspicuous ones include the proportions of the head, face, nose, and lips. Thus there are tall Indians and short ones; there are long-heads and round-heads, high aquiline noses and low concave ones, thick lips and thin.

The relatively high variability of some of these physical attributes and the common occurrence of several non-Mongoloid traits may be interpreted as the result of specialization away from a single generalized Indian type or the result of mixed ancestry. The comparatively recent advent of man in America is a serious obstacle to the first theory. While some diversity in a trait such as stature might be caused by inbreeding or certain habitat factors within so short a time span, the wide range of other characteristics like nose form or lip-thickness cannot reasonably be attributed to the sole agency of evolution.

The obvious alternative to explain this diversity is to postulate the presence of more than one physical type in the Indian make-up. This explanation is confirmed by a certain amount of positive evidence from archaeology. There are several instances of dolichocephaly stratigraphically underlying brachycephaly. Hooton has indicated this sequence in the South-

² Hooton, *Racial Types in America*, pp. 155-186.

west.³ Here an earlier, predominantly short, slender and dolichocephalic population shifts toward a type which is sturdier of build, wider of face, more broad headed, and in general more Mongoloid. As Seltzer has demonstrated with his Hawi-kuh data, this change need not have been a sudden or marked displacement, but was more in the nature of a gradual shift in the range.^{3a}

The physical diversity of the American Indian is amply attested by variations among geographical and cultural areas as well as in prehistoric horizons.⁴ Thus the distinctive Eskimo is the most clearly Mongoloid of Americans, but he departs from this norm in head form. Along the Northwest Coast less prominent cheek bones and more abundant face and body hair suggest a fairly strong non-Mongoloid strain. In the Eastern Woodlands facial features are commonly dominated by a prominent hooked nose, a well developed chin, and less projecting malars. High and convex nasal profiles are also common among Plains Indians, while heavy jaws, prominent cheek bones, thin lips and strong chins all add to the bold relief of the whole face. The Indians of the Southwest have been described as "milder editions" of the Plains type, which is considered "to be an amalgamation of other racial features washed over with dominant Mongoloid characters."⁵ Finally, the southern Mexican Indians are less sturdy in body build with less rugged facial features resulting from thinner convex noses, thicker lips, and smaller chins. Some Indians of the Central and South American hinterlands are said to possess these non-Mongoloid variations to a marked degree.

Seemingly, then, the Indian possesses a number of relatively fixed characteristics which are clearly Mongoloid and a number which are so variable in time and space that students often look to sources in other great racial divisions for an explanation. Dixon made use of such terms as "proto-Australoid," "proto-Negroid" and the like to label some of these

³ Hooton, *Indians of Pecos Pueblo*.

^{3a} Seltzer, *Racial Prehistory in the Southwest*.

⁴ Hooton, *Racial Types in America*.

⁵ *Ibid.*

non-Mongoloid attributes.⁶ Hooton favors the view that the Indian is a varying mixture of earlier, more frequently long-headed people who show affinities with early Mediterranean stock plus suggestions of Negroid and Mongoloid types.⁷ Hrdlička, on the other hand, expresses the opinion that the Mongoloid stock of Asia is sufficiently variable in itself to account for most of the diversity among American Indians.⁸

PAPAGO BACKGROUND

Physical data on the tribes of the Southwest are meager compared with the impressive literature in the fields of ethnology and archaeology. The first physical descriptions, other than the common visual impressions expressed by travellers, missionaries, and the like, appeared in 1892.⁹ This represents a limited survey of several tribes, but the series is so small and the treatment so general that none of the data are used in this paper. In the early part of the present century, Hrdlička spent several seasons among the tribes of northern Mexico and the Southwest. The results of his work have appeared in several publications,¹⁰ and much of this material has been of value to the writer. Seltzer has made extensive surveys among the present day Yaqui,¹¹ Zuñi, Hopi, and Navaho. From this source, for the most part unpublished, the writer has drawn very extensively.

The geographical range of the tribes included in this discussion extends from the Great Basin area to the Valley of Mexico. Only five of the tribes, however, receive detailed attention. These are the Papago, Yaqui, Zuñi, Hopi, and Navaho. These five tribes represent varying parts of the Southwestern culture area. The Papago and Yaqui occupy the southwestern portion of the Southwest. Kroeber identifies

⁶ Dixon, *The Racial History of Man*.

⁷ Hooton, *Racial Types in America*.

⁸ Hrdlička, *The Origin and Antiquity of the American Indian*.

⁹ Ten Kate, *Somatological Observations on Indians of the Southwest*.

¹⁰ Hrdlička, *Physical and Physiological Observations on the Navaho, Physiological and Medical Observations among the Indians of the Southwestern United States and Northern Mexico, On the Stature of the Indians of the Southwest and Northern Mexico, The Pueblos*.

¹¹ Seltzer, *Physical Characteristics of the Yaqui*.

them with the Sonora-Gila-Yuma sub-culture.¹² They share with other tribes of this sub-area a Uto-Aztecan speech. The Yaqui are the southernmost tribe of the five. They are a farming group centering in the lower part of the Yaqui River valley of Sonora. The Papago, a desert branch of the Piman people, are farther north in the foothills and valley floors of northern Sonora and southern Arizona. Their economy is of necessity less agricultural; in former times some of the Papago seem to have lacked opportunity for farming altogether.¹³ The Zuñi and Hopi, with typical Pueblo culture, show many distinctions from the Papago and Yaqui in habitat, speech, and general culture. Finally, the Navaho, who are at the north end of the distribution, show further differences from the four tribes just mentioned. They are set apart by their Athapascan speech and pastoral economy. The presence or lack of physical variation among these tribes is presented in the body of this paper.

The modern Papago, who form the nucleus of this analysis, are located in southwestern Arizona and adjoining northern Sonora. Their language belongs to the Piman division, which in turn is allied with many other Southwestern and Mexican groups under the designation of Uto-Aztecan.¹⁴ The Papago are commonly identified with the Pima tribe immediately north of them: the cultural differences between the two are minor and to a considerable extent due to differing conditions of habitat. This identity has always been recognized by the respective tribes; they refer to themselves by the same name.

They consider themselves one people, though they distinguish River People now called by the whites Pimas, and Desert People, called Papago. Their language is the same, with minor variations.¹⁵

The present location of the Papago within the United States is much the same as it was in early historic times. Father Kino, in 1694, found them south of the Gila River* and west of the Santa Cruz valley, extending westward as far as the

¹² Kroeber, *Cultural and Natural Areas of Native North America*, p. 38.

¹³ Underhill, *Social Organization of the Papago Indians*, p. 20.

¹⁴ Sapir, *Central and North American Languages*, pp. 138-141.

¹⁵ Underhill, *op. cit.*, p. 1.

Colorado River.¹⁶ The western extension is more restricted at the present time. The type of habitat within these bounds is one of the less favorable in North America, as far as human occupation is concerned. For the most part it is hot and arid. Broad valleys separated by low mountain ranges form the usual topography. Vegetation is typically desert: creosote predominates the low dry plains, mesquite and palo verde line the usually dry stream beds, and the hill slopes are variably covered with cacti. A summer rainy season permits a limited amount of farming, but this occupation is so undependable that the Papago have always made greater use of wild foods than their more favorably situated neighbors.¹⁷

Culturally these desert people compare favorably with other Southwestern tribes—remarkably so, one may say, in view of their greater environmental handicaps. The Papago are somewhat less sedentary than the related Pima; during winter months they occupy more permanent villages in the foothills where water is available, and in summer they move to lower areas to take advantage of increased opportunities for farming and food gathering afforded by the rains.

PREHISTORY

The origin of the Papago is not settled. Attempts to establish their entry into their present habitat in late prehistoric times have met with grave obstacles. They are not descended from the Pueblo people to the north: physical differences alone preclude such a possibility. Nor is an eastern origin much more tenable, since that area was infested with their traditional Apache enemies, and archaeological support to such a theory is lacking. To the south, the general lack of evidence from that area makes any prehistoric immigration from Mexico purely hypothetical as yet. Westward lies the Yuman country but the most recent word from that region is a denial of any-

¹⁶ Bolton, *Rim of Christendom*, p. 248.

¹⁷ Russell's *The Pima Indians* remains the most complete ethnographic description of these people. Toward a general description of the Papago there are principally Ruth Underhill's *The Social Organization of the Papago Indians* and *Papago Indian Religion*.

thing but occasional contact across the desert that separates the Colorado people from the Papago.¹⁸

A good deal of archaeological interest has centered about the prehistoric inhabitants of the modern Piman-speaking area. A prehistoric sequence has been determined for the northern part of the area, that centering in the Gila valley.¹⁹ Gladwin has also demonstrated what he believes to have been a dual occupation in this area in the thirteenth to fifteenth centuries.²⁰ This was occasioned by a transitory intrusion from the Pueblo country, which brought in northern traits such as communal houses, coiled pottery, and inhumation of the dead. Seemingly, the native Hohokam practices of paddle-and-anvil pottery-making technique, cremation, semi-subterranean family unit houses, and extensive irrigation systems were continued with little interruption during this so-called Salado visitation. After the withdrawal of this apparently peaceful invasion in the fifteenth century, the Hohokam story becomes obscure, and remains so until the close of the seventeenth century. No archaeological site has been examined that bridges the gap between late prehistoric and early historic periods.

Hence the relationship between Hohokam and the modern Indians of the same area—the Papago and Pima—is still unsettled. Several resemblances occur between the cultures of these two that suggest a direct relationship. Gladwin presents an array of likenesses of this sort that is quite impressive.²¹ Similarities in pottery technique and design, the use of irrigation canals, and house type affinities are the strongest links for this line of reasoning. Gladwin's final analysis of the problem is that the modern Papago are a remnant of the Hohokam who were forced by nomadic pressure into their present homes.

The arrival of the Athapascans is all the excuse needed to explain the disappearance of the Salado people from the Gila Basin. It is quite possible that the late Eastern Salado sites were in no way connected with the

¹⁸ Rogers, *Aboriginal Culture Relations Between Southern California and the Southwest*.

¹⁹ Gladwin, Haury, Sayles, and Gladwin, *Excavations at Snaketown: Material Culture*.

²⁰ Gladwin, *Excavations at Casa Grande, Arizona*.

²¹ Gladwin, *The Red-on-Buff Culture of the Papageria*.

more western Salado sites in the Gila Basin and Tucson, that these Western groups were killed off, and that the remnants of the Hohokam sought refuge in the desert country of the Papageria.²²

These views are not shared by all students of that field, and the question must remain open until more evidence is secured.

HISTORY

Between the last archaeological horizons of the Papago area and the first reliable historic reference to the modern Indians, there is an interruption of more than three hundred years. The Spanish Fray Marcos de Niza is commonly believed to have passed through the eastern limits of the Papago country in 1539 via the Santa Cruz or the San Pedro valley. This is about a century later than the last tree-ring date which marks the exit of the Salado intruders from the Hohokam area.²³ But de Niza makes no mention of contact with Piman people and there is some question of his having come as far north as the present international boundary.²⁴ Likewise, the Coronado expedition, which probably followed a similar route northward from Mexico, and part of which may have passed through the Pima country, left no description of the Indians of that region. It is not until the sojourn among the Pimans of the Jesuit Fray Eusibio Francisco Kino, between 1687 and 1711, that the first historic reference and description of these people is forthcoming.²⁵

Kino found the Papago living essentially as they are today. The Hohokam had disappeared; their large adobe houses and compounds were already largely melted into the ground; and then as now, conflicting Indian stories accounted for the ruins.²⁶ Later historic descriptions of the Pimans add little to our knowledge of their beginnings in southwestern Arizona.

Spanish control of the Papago area, which began with Kino and ended with the Gadsden Purchase in 1853, was never

²² Gladwin, *Excavations at Snaketown: II*, p. 102.

²³ Underhill, *Social Organization of the Papago Indians*, p. 13.

²⁴ Sauer, *The Road to Cibola*, p. 28.

²⁵ The best account in English of Kino among the Piman tribes is H. E. Bolton's *Rim of Christendom*.

²⁶ Underhill, *op. cit.*, p. 10.

intensive, and this area was considerably less influenced by European Spanish culture than was the region to the south. Most of the early contact by Whites was in the form of missionary work, first by the Jesuits, and after 1767, by the Franciscans. The lack of success of both these religious efforts was signal. Cattle ranching by Whites was always discouraging because of the pooriness of the land and the ever-present menace of the Apache. A few superficial commercial contacts occurred after the seventeenth century in the form of mining; these were mostly in Sonora and left but slight impress on the bulk of the Papago.

The purchase by the United States, in 1853, of territory that was later included in the southern part of Arizona, divided the Papago area between this country and Mexico. As more White people penetrated the southern part of the Southwest, especially in the attempts to reach California during the great gold rush, they naturally favored the more congenial Gila valley and avoided the desert regions to the south occupied by Papago. Thus the Papago remained undisturbed for a longer time than did the Pima, and thus too, the differentiation between these two Piman-speaking peoples was heightened.²⁷ The generally inhospitable nature of the Papago habitat has thus helped preserve the natives from White aggression, and the same factor has made the Americanization of the Papago a relatively peaceful and unhurried process. It was not until the twentieth century that miners and cattlemen began encroaching in sufficient numbers to create the need for a reservation. Although a small tract of land south of Tucson was reserved for a minor part of the tribe as early as 1874, the present reservation was not set aside until 1917. Two subsequent enlargements resulted in the establishment of the present area of over two and a half million acres which is occupied today by over six thousand Papago.

²⁷ *Idem*, p. 23.

MEASUREMENTS AND INDICES

In this section are presented a series of metrical observations on the Papago, and derived indices, to place them in relation to other Southwestern tribes, particularly Yaqui, Zuñi, Hopi, and Navaho.

WEIGHT

	No.	Range	Mean	S. D.	C. V.
Papago	219	101-260	157.30±.10	24.20±.78	15.38±.50
Yaqui ¹	100	81-220	140.70±.37	20.30	14.48
Zuñi ²	348	71-190	123.90±.61	17.00±.43	13.72±.35
Hopi ²	276	91-220	133.70±.73	18.00±.52	13.54±.39
Navaho ²	125		137.99		

Difference of Means in Terms of P. E.³

Papago-Yaqui	9.43
Papago-Zuñi	26.52
Papago-Hopi	17.88

The average of 157.3 pounds⁴ describes the Papago as a heavy people. They are markedly heavier than their known Southwestern neighbors. The contrasts in this trait are so great as to suggest to the writer an inherent tendency toward obesity among the Papago. Granting that weight is a highly adaptive characteristic, it should not be denied hereditary meaning. It is difficult to account for the above weight contrasts entirely on a basis of environment. With the exception of the Yaqui, all of the tribes considered live in a generally similar, semi-arid country. All of the groups, save the Navaho and Papago, are basically farmers and subsist largely on vegetable and grain staples. The writer has not observed anything in their personal habits that explains the condition.

Since unknown environmental factors may be at work it is incautious to attempt a final judgment in this matter of weight.

¹ Seltzer, *Physical Characteristics of the Yaqui*.

² Carl Seltzer, unpublished data. Note that the Navaho series of 125 individuals does not represent Seltzer's complete sample of that tribe.

³ P. E. indicates probable error.

⁴ Four pounds deducted for clothing.

But the writer submits the opinion that an inherent factor contributes to the relative obesity of the Papago.

STATURE

	No.	Range	Mean	S. D.	C. F.
Papago	219	158-184	168.81±.23	4.95±.16	2.93±.09
Yaqui	100	143-181	166.68±.44	6.57	3.94
Zuñi	348	146-178	161.43±.18	4.86±.12	3.01±.08
Hopi	276	140-175	161.10±.21	5.28±.15	3.28±.09
Navaho	125		169.63		

Difference of Means in Terms of P. E.

Papago-Yaqui	4.26
Papago-Zuñi	25.4
Papago-Hopi	24.8

Other Southwestern groups:⁵

	No.	Range	Mean		No.	Range	Mean
Otomi	62		159.3	Mayo	53	155-185	167.3
Mazahua	41	149-175	160.9	Havasupai	47	155-180	168.4
Tlailhuiltec	50	154-173	161.0	Yaqui	50	157-180	169.6
Tarasco	50	156-176	163.1	Navaho	90	162-180	169.9
Cora	53	150-175	163.1	Papago	50	155-181	170.9
Nahua	50	156-177	164.3	Mohave	45	162-186	171.6
Pueblos	447	148-182	164.3	Pima	53	162-181	171.8
Tepehuane	40	157-181	165.3	Yuma	37	160-185	172.2
Southern Ute	50	153-179	166.8	Maricopa	40	162-185	174.9
Opata	30	159-180	167.0				

The mean stature of 168.8 centimeters places the Papago in the medium-tall category. This, coupled with their rather impressive weight, establishes them as a generously proportioned people. It is well to add the observation that the Papago, though large, are not big-boned. Their more than average bulk is owed less to skeletal massiveness than to development of the soft parts.

The stature of the Papago series in Hrdlička's material is about two centimeters greater than that of the writer. The writer's Papago series is more than 4.5 centimeters taller than Hrdlička's average for the Pueblo people. This excess is still greater when the Papago are compared with Seltzer's Zuñi and Hopi values.

Hrdlička's data indicate that only a few Southwestern

⁵ Throughout this section data labelled "Other Southwestern groups" has been derived from Hrdlička, *The Pueblos*.

tribes are taller than the Papago. It should be noted that the four tribes recorded by Hrdlička as taller than the Papago are the Mohave, Pima, Yuma, and Maricopa. These groups are also closer to the Papago geographically and culturally than they are to the Pueblo or Mexican groups.

Hrdlička's data also show that the Papago and Navaho are allied by more than moderate tallness. This likeness, however, is offset by other significant traits to a greater degree than is true of the Piman- and Yuman-speaking groups.

South of Papagueria, according to Hrdlička, there exists a considerable range in stature. There are short people, like the Otomi and Mazahua, while other tribes are fairly tall. If the distribution is extended northward to include the Yuman-speaking groups in Arizona, there results a striking range of more than 15 centimeters. This high variability, occurring in a generally homogeneous habitat, has been remarked by others.⁶

A geographical trend is also suggested by the stature distribution. The Papago and their nearest neighbors, the Pima, Maricopa, Yuma, and Mohave, form an island of maximum tallness. South of this island average statures decrease. The shortest tribes are generally farthest south. On the other side of the Piman-Yuman island of tallness is a recurrence of shortness among the Pueblo groups.

SPAN

	No.	Range	Mean	S. D.	C. V.
Papago	215	161-190	174.63±.26	5.64±.18	3.23±.10
Yaqui	100	158-190	172.20±.43	6.33	3.68
Zuñi	346	149-187	167.04±.23	6.45±.17	3.86±.10
Hopi	272	146-184	165.00±.24	5.77±.17	3.51±.10
Navaho	125		175.82		

Difference of Means in Terms of P. E.

Papago-Yaqui	4.86
Papago-Zuñi	21.69
Papago-Hopi	27.34

RELATIVE SPAN

	No.	Range	Mean	S. D.	C. V.
Papago	215	94-109	103.52±.11	2.34±.08	2.26±.07

⁶ Hrdlička, *Physiological and Medical Observations among the Indians of the Southwest and Northern Mexico*; Hooton, *Up from the Ape*.

Yaqui	100	96-113	102.94 \pm .17	2.40	2.39
Zuñi	346	94-111	103.54 \pm .09	2.40 \pm .06	2.32 \pm .06
Hopi	271	96-111	102.44 \pm .10	2.50 \pm .07	2.44 \pm .07
Navaho	125		103.57		

Difference of Means in Terms of P. E.

Papago-Yaqui	2.86
Papago-Zuñi	0.14
Papago-Hopi	7.25

Other Southwestern groups:

	<i>Mean</i>		<i>Mean</i>
Apache	100.6	Pueblos	102.7
Tarahumare	100.9	Mohave	103.0
Huichol	101.7	Maricopa	103.7
Tarasco	101.7	Pima	103.0
Aztec	102.1	Yuma	103.8
Papago	102.3	Yaqui	105.0
Otomi	102.4		

The Papago are moderately long-armed and broad-shouldered. In this respect they do not differ significantly from Hrdlička's average for all American Indians.

As their greater gross size would suggest, the Papago show a marked excess over the Pueblos in absolute arm span. In relation to stature, span differences dwindle decidedly; now the Papago are nearly identical with the Zuñi, according to the data of Seltzer and the writer. Hrdlička's Papago and Pueblo groups also show close agreement. All of the Mexican tribes, excepting the Yaqui, have relatively less arm span than the Papago. As in stature, the Papago closely approach the nearby Pima, Maricopa, and Yuma tribes.

The Papago and Navaho have nearly the same relative arm span as indicated by the recordings of Seltzer and the writer. Hrdlička's data show that the other Athapascan group, the Apache, has a lesser relative arm span than does the Papago.

SITTING HEIGHT

	<i>No.</i>	<i>Range</i>	<i>Mean</i>	<i>S. D.</i>	<i>C. V.</i>
Papago	219	78-95	87.34 \pm .13	2.19 \pm .09	3.33 \pm .11
Yaqui	100	71-91	83.10 \pm .20	2.91	3.50
Zuñi	348	77-94	84.66 \pm .10	2.97 \pm .03	3.51 \pm .09
Hopi	278	71-94	83.94 \pm .15	3.60 \pm .10	4.29 \pm .12
Navaho	125		88.90		

Difference of Means in Terms of P. E.

Papago-Yaqui	17.07
Papago-Zuñi	16.75
Papago-Hopi	17.00

Other Southwestern groups:

	No.	Mean		No.	Mean
Otomi	50	82.6	Apache	212	90.0
Aztec	51	83.9	Yaqui	19	90.3
Tarascan	50	84.2	Pima	53	90.4
Huichol	24	84.3	Navaho	90	90.5
Pueblo	183	85.8	Papago	50	90.6
Cora	51	86.2	Yuma	29	90.6
Tarahumare	23	87.0	Mohave	45	90.8
Southern Ute	50	88.8	Maricopa	40	91.2
Walapai	35	89.5			

RELATIVE SITTING HEIGHT

	No.	Range	Mean	S. D.	C. V.
Papago	219	48-57	51.82±.07	1.54±.05	2.97±.10
Yaqui	100	46-55	49.72±.10	1.54	3.10
Zuñi	348	48-57	52.42±.05	1.40±.04	2.67±.07
Hopi	276	46-59	52.10±.08	1.86±.05	3.57±.10
Navaho	125		52.41		

Difference of Means in Terms of P. E.

Papago-Yaqui	17.50
Papago-Zuñi	6.98
Papago-Hopi	2.64

Other Southwestern groups:

	No.	Mean		No.	Mean
Huichol	24	51.4	Maricopa	40	52.6
Yaqui	19	51.7	Papago	50	52.9
Otomi	50	52.1	Mohave	45	52.9
Cora	51	52.2	Tarahumare	23	53.0
Aztec	51	52.2	Walapai	35	53.1
Tarasco	50	52.2	Southern Ute	50	53.2
Yuma	29	52.3	Apache	212	53.2
Pueblo	183	52.4	Navaho	90	53.3
Pima	53	52.6			

The absolute sitting height of the Papago is somewhat greater than that of the average American Indian, as one would expect of a tribe that tends to tallness.

In the Southwest, the greatest contrast occurs between the Papago and the Yaqui when the reports of Seltzer and the writer are compared. Seltzer's recordings describe the Yaqui

as more than four centimeters shorter than the Papago in sitting height. This is twice as great as the Papago superiority in total stature. Obviously, if these comparisons are valid, the greater stature of the Papago is due mostly to a much greater sitting height. The contrast is more manifest in the ratio of sitting height to total stature; a glance at the table describes the Papago as clearly shorter legged relative to stature than the Yaqui. Hrdlička's data also define the Yaqui as longer-legged than the Papago, although the difference as given in his series is less striking.

Since the Papago are much taller than the Pueblo people, it is to be expected that they exceed them in sitting height. Relative to stature this gross difference is leveled to the point of being slightly reversed. Both the Zuñi and Hopi, according to Seltzer and the writer, are somewhat shorter-legged than the Papago, the Zuñi more so than the Hopi.

The data above present a distribution that may be more than coincidental. Seltzer has remarked the striking inferiority of the Yaqui in absolute and relative sitting height as compared with the shorter Zuñi and Hopi.⁷ The writer finds the same condition when comparing the Yaqui and the Papago. The Yaqui, as far as this complex of traits is concerned, seem to have a more specialized tendency to greater leg length.

The place of the Papago is apparently intermediate between the Yaqui to the south and the Pueblos to the north. The Papago exhibit high values in the absolute measurement, but their relative leg length is less than the Yaqui and more than the Pueblos.

Compared with the farther removed Navaho, who, it is recalled, are slightly taller than the Papago, a similar tendency is recorded: the Papago are a little shorter in sitting height in absolute values, but somewhat longer-legged relative to stature.

Hrdlička's series of the Papago, the Pueblos, Navaho, and Yaqui are at variance with those of Seltzer and the writer. All of Hrdlička's series have greater absolute values. His data on relative sitting height are also dissimilar, but there is a sug-

⁷ Seltzer, *Physical Characteristics of the Yaqui*.

gestion of the tendency noted above. The Yaqui are exceeded only by the Huichol in relative leg length. His other southern groups fall at the lower end of the scale, excepting, possibly, the Tarahumare. His Papago series is slightly above the Pueblo, although the former are still relatively longer-legged than several other northern groups, including the Navaho, Apache, and Southern Ute. The nearby Yumans and the Papago are closely similar in leg length.

SHOULDER BREADTH

	No.	Range	Mean	S. D.	C. V.
Papago	219	34-45	38.69±.08	1.74±.06	4.50±.14
Yaqui	100	31-42	37.82±.12	1.86	4.92
Zuñi	348	31-45	37.43±.07	1.89±.05	5.05±.13
Hopi	277	28-42	37.43±.07	1.83±.05	4.89±.14
Navaho	125		38.23		

Difference of Means in Terms of P. E.

Papago-Yaqui	6.21
Papago-Zuñi	11.89
Papago-Hopi	11.89

RELATIVE SHOULDER BREADTH

	No.	Range	Mean	S. D.	C. V.
Papago	219	20-27	23.02±.05	1.10±.04	4.78±.15
Yaqui	100	20-25	22.64±.06	0.88	3.89
Zuñi	348	20-27	23.16±.04	1.08±.03	4.66±.12
Hopi	276	18-27	23.26±.05	1.16±.03	4.99±.14
Navaho	125		22.54		

Difference of Means in Terms of P. E.

Papago-Yaqui	4.87
Papago-Zuñi	2.18
Papago-Hopi	3.39

To judge from the known groups of the world, the Papago rank among the relatively broad-shouldered. They compare favorably with the highest European values and are close to the top of the range in other areas.⁸ Adequate data for other Southwestern Indians are confined to those of Seltzer. The table above indicates that the Papago have broader shoulders than any other tribe.

The more important value, the ratio of shoulder breadth

⁸ Martin, *Lehrbuch der Anthropologie*, pp. 347-348.

to stature, changes the distribution of variation. Both the Zuñi and the Hopi surpass the Papago in this ratio, though the differences are not great. More marked is the comparison between Papago and Yaqui. The Papago are intermediate between the narrower-shouldered Yaqui and the relatively broader-shouldered Pueblos. The Navaho are inferior to the Papago in this proportion.

BI-ILIAC BREADTH

	No.	Range	Mean	S. D.	C. V.
Papago	219	24-39	29.56±.10	2.28±.07	7.71±.25
Yaqui	100	20-35	29.64±.13	1.88	6.34
Zuñi	348	20-35	28.30±.07	2.00±.05	7.07±.18
Hopi	277	24-35	29.98±.07	1.78±.05	5.94±.17
Navaho	125		29.97		

Difference of Means in Terms of P. E.

Papago-Yaqui	0.50
Papago-Zuñi	10.30
Papago-Hopi	3.44

SHOULDER-HIP INDEX

	No.	Range	Mean	S. D.	C. V.
Papago	219	62- 91	75.93±.23	5.07±.16	6.68±.22
Yaqui	100	66- 93	78.98±.32	4.76	6.03
Zuñi	348	62- 89	75.58±.16	4.40±.11	5.82±.15
Hopi	277	68-101	79.98±.19	4.72±.14	5.90±.17
Navaho	125		78.38		

Difference of Means in Terms of P. E.

Papago-Yaqui	7.74
Papago-Zuñi	1.25
Papago-Hopi	13.60

The absolute hip breadth of Southwestern Indians tends to broadness. The Papago are nearly identical with the Yaqui in this measurement. The two Pueblo groups differ from the Papago in opposite directions: the Hopi have wider hips, while the Zuñi show a much lesser average. In view of the much greater stature and weight of the Papago, their inferiority to the Hopi in hip breadth is striking. The Navaho are also broader-hipped than the Papago.

Relative to shoulder breadth, the Papago have much narrower hips than do the Yaqui, Navaho, and Hopi. Most con-

spicuous is the difference between the Papago and Hopi. The Zuñi do not depart far from the Papago mean, the latter being slightly broader-hipped relative to shoulder breadth.

CHEST BREADTH

	No.	Range	Mean	S. D.	C. V.
Papago	218	26-37	30.18±.10	2.19±.07	7.26±.23
Yaqui	100	23-34	27.87±.12	1.83	6.57
Zuñi	348	23-34	27.66±.07	1.89±.05	*6.83±.17
Hopi	277	20-34	28.35±.08	1.98±.05	6.98±.20
Navaho	125		27.99		

Difference of Means in Terms of P. E.

Papago-Yaqui	14.44
Papago-Zuñi	21.00
Papago-Hopi	14.30

Other Southwestern groups:

	No.	Mean		No.	Mean
Aztec	54	27.7	Yaqui	19	30.3
Huichol	24	28.2	Walapai	35	30.4
Tarasco	50	28.3	Apache	52	30.8
Otomi	50	28.6	Papago	50	30.8
Tarahumare	22	28.7	Pima	53	31.2
Cora	51	28.7	Mohave	45	31.2
Navaho	50	29.7	Yuma	53	31.4
Southern Ute	49	29.8	Maricopa	40	32.2
Pueblo	183	29.9			

CHEST DEPTH

	No.	Range	Mean	S. D.	C. V.
Papago	218	18-29	22.16±.09	2.04±.07	9.21±.30
Yaqui	100	16-25	21.38±.12	1.78	8.38
Zuñi	347	16-27	19.82±.06	1.60±.04	8.07±.20
Hopi	277	16-29	21.18±.07	1.70±.05	8.03±.23
Navaho	125		20.63		

Difference of Means in Terms of P. E.

Papago-Yaqui	5.20
Papago-Zuñi	21.65
Papago-Hopi	8.91

Other Southwestern groups:

	No.	Mean		No.	Mean
Navaho	50	21.6	Huichol	24	22.7
Pueblo	183	21.8	Yaqui	19	22.7
Southern Ute	49	22.0	Tarahumare	22	22.9
Cora	51	22.2	Yuma	29	22.9
Aztec	54	22.3	Pima	53	23.0
Tarasco	50	22.5	Papago	50	23.1
Apache	52	22.6	Otomi	50	23.2
Mohave	45	22.7	Maricopa	40	23.8

THORACIC INDEX

	No.	Range	Mean	S. D.	C. V.
Papago	217	57-84	73.02±.22	4.76±.15	6.52±.21
Yaqui	100	67-90	76.78±.31	4.60	5.99
Zuñi	347	59-86	71.78±.15	4.20±.11	5.85±.15
Hopi	277	55-	74.90±.21	5.28±.15	7.05±.20
Navaho	75		72.56		

Difference of Means in Terms of P. E.

Papago-Yaqui	9.89
Papago-Zuñi	4.59
Papago-Hopi	6.27

Other Southwestern groups:

	No.	Mean		No.	Mean
Mohave	50	72.7	Papago	50	74.8
Navaho	50	72.7	Yaqui	19	75.2
Pueblos	183	73.1	Cora	51	77.5
Walapai	35	73.2	Tarasco	50	79.5
Apache	52	73.3	Tarahumare	22	79.9
Pima	53	73.7	Aztec	54	80.4
Southern Ute	49	73.8	Huichol	24	80.5
Maricopa	40	73.8	Otomi	50	80.9
Yuma	29	74.0			

The Papago are a broad chested people. They stand well above all the tribes recorded by Seltzer. The short and stocky Hopi are closest to the Papago in absolute breadth, although surpassed by nearly two centimeters on the average. The Navaho are strikingly narrower-chested than the Papago, especially in relation to stature, and the Yaqui are also conspicuously inferior to the Papago. The greatest contrast occurs between the Papago and Zuñi.

In Hrdlička's series, the Papago again exceed the Yaqui, Pueblos, and Navaho in chest breadth although the differences are less marked. The Papago average is closest to some of their nearest neighbors: the Pima, Yuma, Mohave, Walapai, and Yaqui. All of the Mexican groups have narrower chests than the Papago.

The chest depth of the Papago exceeds that of the Pueblos and Yaqui. According to the data of Seltzer and the writer, the Yaqui are closest to the Papago, while the Hopi, Navaho, and Zuñi are increasingly removed. Hrdlička's values for comparable tribes are higher, but they show a similar distri-

bution. His material indicates that the Papago are among the deeper-chested Southwestern groups, exceeded only by the Otomi and Maricopa. It is interesting to note that in Hrdlička's series, the tall Navaho have the least chest depths. The Pueblo mean is also near the lower end of the distribution.

The thoracic indices indicate that the Papago are not as deep-chested relative to chest breadth as are the Yaqui and, according to Seltzer, the Hopi. The smaller Zuñi and the taller Navaho are both relatively flatter-chested.

Hrdlička's data on thoracic ratios also suggest that the Yaqui have deeper chests than the Papago. All of the other Mexican groups have relatively deeper chests than the Papago. Hrdlička's Pueblo average is below the Papago, but no more so than Seltzer's would be if his Zuñi and Hopi series were lumped together. The Pueblo groups have much shallower chests than the Mexicans although this deficiency is surpassed among the Navaho and Mohave. The remaining Yuman and Athapaskan values are between Navaho and Mohave and the Papago.

There is in this distribution a general north to south increase in relative chest depth. With the conspicuous exception of the Pueblo Indians, there is also a correlation among the tribes between lesser chest depth and greater stature.

HEAD CIRCUMFERENCE

	No.	Range	Mean	S. D.	C. V.
Papago	219	505-594	552.65±.63	13.80±.44	2.50±.08
Yaqui	100	490-564	546.20±.98	14.55	2.66
Zuñi	348	505-594	547.10±.55	15.15±.39	2.77±.07
Hopi	275	490-609	554.45±.66	16.35±.47	2.95±.08
Navaho	100		558.26		

Difference of Means in Terms of P. E.

Papago-Yaqui	5.55
Papago-Zuñi	6.63
Papago-Hopi	1.97

The only data which describe this trait in the Southwest are those of Seltzer and the writer. Compared with the Papago, the Yaqui have the smallest heads, though they are closely seconded by the Zuñi. The Navaho show the highest values.

Difference between the Papago and Hopi is probably not significant in itself, but in view of the large difference in their general body size, the relative similarity in head circumference becomes more interesting.

HEAD LENGTH

	No.	Range	Mean	S. D.	C. V.
Papago	219	164-205	186.66±.27	5.89±.19	3.19±.10
Yaqui	100	161-202	183.04±.43	6.42	3.49
Zuñi	348	161-214	179.88±.25	6.99±.18	3.89±.10
Hopi	278	161-202	183.00±.29	7.14±.20	3.90±.11
Navaho	125		184.87		
Pueblos (Hrdlička)	306	168-207	184.9		

Difference of Means in Terms of P. E.

Papago-Yaqui	5.53
Papago-Zuñi	18.32
Papago-Hopi	9.24

HEAD BREADTH

	No.	Range	Mean	S. D.	C. V.
Papago	219	138-164	150.25±.23	5.10±.16	3.39±.11
Yaqui	100	135-161	149.23±.34	4.98	3.34
Zuñi	348	131-170	152.80±.21	5.83±.15	3.81±.10
Hopi	278	138-173	153.55±.25	6.15±.18	4.01±.11
Navaho	125		158.89		
Pueblos (Hrdlička)	306	137-168	149.4		

Difference of Means in Terms of P. E.

Papago-Yaqui	2.48
Papago-Zuñi	8.19
Papago-Hopi	9.73

CRANIAL INDEX

	No.	Range	Mean	S. D.	C. V.
Papago	219	71-91	80.52±.16	3.57±.12	4.43±.14
Yaqui	100	72-92	81.28±.27	3.96	4.87
Zuñi	348	72-98	85.09±.16	4.47±.11	5.25±.17
Hopi	278	72-98	84.01±.20	4.98±.14	5.93±.17
Navaho	125		85.97		

Difference of Means in Terms of P. E.

Papago-Yaqui	2.42
Papago-Zuñi	20.20
Papago-Hopi	13.62

Other Southwestern groups :

	No.	Mean		No.	Mean
Tarahumare	22	75.9	Nahua	49	80.0
Pima	52	76.4	Mayo	50	80.2
Mazahua	41	77.1	Pueblos	306	80.8
Tarasco	48	77.4	Cora	51	81.0
Otomi	60	78.1	Huichol	30	81.3
Yaqui	47	78.3	Maricopa	38	81.5
Papago	50	78.5	Walapai	34	83.3
Aztec	46	79.1	Navaho	28	83.7
Southern Ute	50	79.2	Mohave	45	84.4
Opata	31	79.3	Apache	144	84.5
Tepehuane	40	79.7			

Head measurements among the Papago are not so distorted by cranial deformation as they are among some of the other Southwestern tribes. The Papago occiput, though typically not protrusive and even flattened in many cases, is only occasionally deformed.⁹ Seltzer mentions a slight amount of occipital flattening among the Yaqui, but he adds that it is not enough significantly to distort head measurements.¹⁰ The Zuñi, according to the same investigator, show more deformation; so much so, that their average head length of 179.88 millimeters among all individuals measured is about 3.5 millimeters less than the same diameter found in 22 undeformed heads of the tribe. This condition, Seltzer believes, brings the relatively undeformed Yaqui crania quite close to the Zuñi average.¹¹ Just how much the Hopi and Navaho are affected by cradling practices, the writer does not know. Both of these tribes still use the cradle board to some extent, so there may be as much shortening of the head among them as among the Zuñi.

For the above reasons, comparisons are not altogether satisfactory. In spite of the effects of cradling, the Papago

⁹ The cradle board is not used among the Papago today, although described by Russell, *The Pima Indians*, p. 103. At present, if any special cradle is used, it is a small cot or a hammock of cordage and textile. It is not known when the native cradle board went out of use, but many of the older adults still living must have been exposed to the practice of cradling. Nevertheless, there is no higher frequency of occipital deformation among the older Papago in the writer's series. Whether the Papago cradle was softer and less confining than types used by other tribes, or whether other factors account for the differing degrees of deformation, is not known.

¹⁰ Seltzer, *Physical Characteristics of the Yaqui*, p. 97.

¹¹ *Ibid.*

probably do possess longer heads than do the Pueblo people. Hrdlička in the Southwest¹² and others elsewhere have demonstrated a direct correlation between head length and total stature. Hrdlička's Southwestern data show that the tallest males are more than five millimeters longer-headed than the shortest. The differences shown in the table above are doubtless exaggerations. If Seltzer's correction of 3.5 millimeters, as he uses for the Zuñi, is applied to the Hopi series, the result is an average head length quite near that of the Papago. Such an adjustment is at best questionable. It obliterates the excess of head length expected of the taller Papago. The same correction applied to the Navaho raises their head length mean from below to above that of the Papago.

On the whole, the suggested status of the Papago in relation to the Hopi and Navaho is little better than conjectural, and must remain so for the present. In regard to the remaining tribes, the Papago clearly exceed the Yaqui and Zuñi.

Southwestern Indians, on the whole, are moderately broad-headed. The Papago excess over the Yaqui is of doubtful significance. Some of the other comparisons suggest ethnic differences. How much of the Pueblo and Navaho superiority over the Papago is caused by occipital flattening is impossible to say.

Hrdlička's average head breadth for all the Pueblos describes them as narrower-headed than the Papago.

The known Southwestern tribes range from quite dolichocranial to extremely brachycranial. The Papago show a similar amount of scatter, with a mesocranial mean. Seltzer's material shows that the Yaqui cranial ratio exceeds that of the Papago by less than 1 percent. His other tribes—the Zuñi, Hopi, and Navaho—are significantly more broad-headed than are the Papago. The real meaning of these comparisons is again clouded by the afore-mentioned artificial deformation.

Hrdlička's data on twenty-one tribes show considerable variety. His values for groups that can be matched by Seltzer or the writer are all lower. The means for his tribes demonstrate that the two Athapascan groups, Apache and Navaho,

¹² Hrdlička, *The Pueblos*, p. 287.

are among the most broad-headed in the Southwest. The Yuman tribes, the Mohave particularly, also show relatively high values. The Pueblo Indians are distinctly less brachycranial than are the Southern Athapascans. Lower cranial ratios seem more characteristic of southern tribes, including the Papago and Yaqui.

HEAD HEIGHT

	No.	Range	Mean	S. D.	C. V.
Papago	219	110-149	130.26±.29	6.28±.20	4.82±.16
Yaqui	100	109-158	128.05±.59	8.70	6.79
Zuñi	348	99-148	127.80±.27	7.40±.19	5.79±.15
Hopi	277	99-148	126.85±.32	7.95±.23	6.27±.18
Navaho	125		132.42		

Difference of Means in Terms of P. E.

Papago-Yaqui	3.36
Papago-Zuñi	6.21
Papago-Hopi	7.90

Other Southwestern groups:

No.	Mean	No.	Mean
Cora	51 132.0	Huichol	30 134.1
Otomi	60 132.3	Opata	31 134.2
Walapai	34 132.9	Apache	144 134.4
Tarahumare	22 133.0	Papago	50 135.8
Yaqui	47 133.5	Pueblos	306 136.0
Aztec	46 133.5	Mohave	45 136.4
Nahua	49 133.6	Pima	52 136.9
Southern Ute	50 133.7	Maricopa	38 138.6
Tarasco	48 133.8	Navaho	26 140.2
Mayo	50 133.9		

As regard the data on head height, some differences in measuring techniques among the several sources should be pointed out. The consistently higher values recorded by Hrdlička are probably due to his use of a special head spanner which records the distance from the vertex to the lower border of the external ear meatus. The measurements of Seltzer and the writer were taken from vertex to trignon. Seltzer's head heights result from subtracting the projected height of trignon from the total stature. The writer used this method also, but supplemented it by direct measurement with the anthropometer; when the values did not agree, the direct measurement was chosen as the more accurate. Had the writer used only

the values obtained from projected measurements they would have been a little lower, on the average.

The techniques of Seltzer and the writer are similar enough to allow comparison. Accordingly, the Papago have greater head height average than any of Seltzer's tribes, excepting the Navaho. The greatest contrast obtains between the Papago and Hopi, though the Zuñi inferiority is also conspicuous.

Hrdlička's data take exception to one aspect of the above comparisons. His Pueblo average is located above rather than below the Papago mean. Furthermore, the inferiority of the Yaqui to the Papago is more pronounced in his distribution, and the Navaho are more conspicuously high-headed. Hrdlička also remarks on a general direct association between absolute head height and total stature.

LENGTH-HEIGHT INDEX

	No.	Range	Mean	S. D.	C. V.
Papago	219	53-84	69.77±.16	3.60±.12	5.16±.17
Yaqui	100	57-83	69.91±.31	4.65	6.65
Zuñi	348	60-83	70.90±.15	4.02±.10	5.87±.14
Hopi	277	54-80	69.25±.18	4.38±.13	6.32±.18
Navaho	75		72.09		

Difference of Means in Terms of P. E.

Papago-Yaqui	0.40
Papago-Zuñi	5.15
Papago-Hopi	2.16

BREADTH-HEIGHT INDEX

	No.	Range	Mean	S. D.	C. V.
Papago	219	73-102	86.45±.22	4.77±.15	5.52±.18
Yaqui	100	68-99	85.54±.43	6.32	7.39
Zuñi	348	68-99	83.74±.18	4.92±.13	5.88±.15
Hopi	277	68-95	82.78±.21	5.28±.15	6.38±.18
Navaho	75		83.80		

Difference of Means in Terms of P. E.

Papago-Yaqui	1.89
Papago-Zuñi	9.54
Papago-Hopi	12.08

Relative to head length the Papago average identifies them as hypsicanial. Among the tribes recorded by Seltzer, the Yaqui are practically identical with the Papago. The Zuñi and

Hopi diverge from the Papago in opposite directions; the Zuñi superiority is more pronounced than the Hopi inferiority. The Zuñi excess over the Papago is caused not by greater absolute head height but by lesser head length. The Navaho stand in greater contrast to the Papago than any other tribe.

Significant variations are apparent among the tribes when head height is expressed in relation to maximum cranial breadth. This ratio describes the Papago as the highest vaulted of the recorded groups, although the Yaqui share with them the acrocranial class. The Zuñi and Navaho are almost equally distant below the Papago mean; they are both significantly lower-vaulted. The Hopi are even more divergent from the Papago in the same direction. The Papago surpass the Hopi and Zuñi because their heads are both higher and narrower in absolute values; their excess over the Navaho is owing to their narrower heads alone since the Navaho are superior in absolute head height.

MINIMUM FRONTAL BREADTH

	<i>No.</i>	<i>Range</i>	<i>Mean</i>	<i>S. D.</i>	<i>C. V.</i>
Papago	219	93-124	106.70±.23	4.96±.16	4.65±.15
Yaqui	100	85-116	100.78±.40	5.92	5.87
Zuñi	348	89-120	103.62±.17	4.80±.12	4.63±.12
Hopi	278	89-116	104.14±.17	4.28±.12	4.11±.12
Navaho	125		108.16		

Difference of Means in Terms of P. E.

Papago-Yaqui	12.32
Papago-Zuñi	10.78
Papago-Hopi	8.96

Other Southwestern groups:

	<i>No.</i>	<i>Mean</i>		<i>No.</i>	<i>Mean</i>
Aztec	54	101.1	Cora	51	103.9
Opata	31	101.6	Pima	53	105.1
Otomi	62	102.8	Papago	50	105.1
Tarasco	50	102.9	Nahua	50	106.0
Yaqui	52	103.0	Yuma	29	106.0
Mayo	53	103.1	Mohave	45	106.3
Tepehuane	40	103.2	Apache	123	108.0
Walapai	35	103.6	Maricopa	40	108.1
Pueblos	370	103.8			

FRONTO-PARIETAL INDEX

	<i>No.</i>	<i>Range</i>	<i>Mean</i>	<i>S. D.</i>	<i>C. V.</i>
Papago	219	63-83	70.54±.13	2.94±.09	4.17±.13

Yaqui	100	55-75	67.70±.25	3.72	5.49
Zufi	348	58-78	67.88±.11	3.00±.08	4.42±.11
Hopi	278	58-78	67.76±.13	3.18±.09	4.69±.13
Navaho	125		68.07		

Difference of Means in Terms of P. E.

Papago-Yaqui	10.08
Papago-Zufi	15.63
Papago-Hopi	15.11

The minimum frontal average for the Papago tends to broadness. Among the Southwestern groups recorded by Seltzer a higher average is found among the Navaho. Hrdlička's data give greater forehead breadth to the Nahua, the Apache, and three of the Yuman tribes. A very considerable contrast obtains between the Papago and Yaqui. The Pueblo Indians are located below the Papago and above the Yaqui. The remaining tribes of Mexico all have narrower foreheads than the Papago.

The high position of the Papago in forehead breadth coupled with rather inferior maximum head breadth results in a much higher fronto-parietal index than is shown by the other tribes. These comparisons place the Navaho closest to the Papago, although the difference is more than 2 percent less. The Zufi, Hopi, and Yaqui show still lower averages; they are all significantly different from the Papago.

MAXIMUM FACE BREADTH

	No.	Range	Mean	S. D.	C. V.
Papago	217	125-154	142.25±.24	5.20±.17	3.66±.12
Yaqui	100	120-159	141.00±.39	5.85	4.15
Zufi	348	130-165	143.60±.19	5.15±.13	3.52±.09
Hopi	278	130-164	144.95±.22	5.35±.15	3.69±.11
Navaho	125		146.33		

Difference of Means in Terms of P. E.

Papago-Yaqui	2.72
Papago-Zufi	4.41
Papago-Hopi	8.31

Other Southwestern groups:

	No.	Mean		No.	Mean
Aztec	50	138.2	Mazahua	41	139.9
Tarasco	50	138.2	Huichol	29	140.4
Otomi	50	138.4	Opata	30	140.7
Nahua	49	139.8	Tarahumare	23	140.9

Tepehuane	40	141.6	Southern Ute	50	145.3
Mayo	53	141.7	Walapai	35	146.1
Yaqui	51	141.7	Navaho	50	147.1
Cora	50	141.8	Yuma	29	147.2
Pueblos	452	141.9	Mohave	85	147.9
Papago	50	143.2	Maricopa	40	148.4
Pima	53	144.5	Apache	158	149.0

The Papago have rather broad faces compared with many world groups, but among other American Indians their bizygomatic breadth is not so conspicuous. In the Southwest they are exceeded by the Pueblo and Navaho groups of Seltzer's series. Hrdlička's averages show that the Papago are inferior to the Yuman and Athapascan peoples. The Papago, in turn, surpass all of the recorded Mexican tribes. The distribution of this variable closely follows that of maximum head breadth. There is also a general geographic trend in evidence: the narrowest faces occur among the southern tribes.

CEPHALO-FACIAL INDEX

	No.	Range	Mean	S. D.	C. F.
Papago	217	85-105	94.25±.14	3.15±.10	3.34±.11
Yaqui	100	81-107	94.18±.28	4.08	4.31
Zuñi	348	84-107	94.06±.11	2.97±.08	3.16±.08
Hopi	278	84-107	94.36±.14	3.36±.10	3.56±.10
Navaho	125		92.08		

Difference of Means in Terms of P. E.

Papago-Yaqui	0.22
Papago-Zuñi	1.07
Papago-Hopi	0.36

The facial breadth of the Papago is rather great in relation to the maximum width of the head. The variations from the Papago mean shown by the Yaqui, Zuñi, and Hopi are slight. The Navaho inferiority, which is significant, is caused primarily by their greater head breadth.

ZYGOFRONTAL INDEX

	No.	Range	Mean	S. D.	C. F.
Papago	217	68-87	74.58±.14	3.00±.10	4.02±.13
Yaqui	100	65-95	72.06±.33	4.96	6.88
Zuñi	348	64-83	72.22±.11	3.08±.08	4.26±.11
Hopi	278	64-79	71.86±.11	2.68±.08	3.73±.11
Navaho	125		74.00		

Difference of Means in Terms of P. E.

Papago-Yaqui	7.04
Papago-Zuñi	13.26
Papago-Hopi	15.28

The zygo-frontal ratio describes the Papago as narrower-faced relative to frontal breadth than their neighbors. These contrasts are in some cases due to greater forehead width among the Papago and in others to inferior facial breadth. The considerably lower ratios of the Yaqui and Zuñi are owed mostly to their narrower foreheads, while the inferiority of the Hopi is equally the result of greater face breadth and lesser forehead width. The Navaho show the nearest approach to Papago proportions.

TOTAL FACE HEIGHT

	No.	Range	Mean	S. D.	C. V.
Papago	218	115-149	133.50±.27	5.90±.19	4.42±.14
Yaqui	100	105-149	127.50±.44	6.50	5.10
Zuñi	348	105-149	126.00±.21	5.90±.15	4.68±.12
Hopi	277	100-139	122.45±.26	6.40±.18	5.23±.15
Navaho	125		125.52		

Difference of Means in Terms of P. E.

Papago-Yaqui	11.61
Papago-Zuñi	21.90
Papago-Hopi	29.52

Other Southwestern groups:

	No.	Mean		No.	Mean
Aztec	50	112.9	Mazahua	41	118.6
Tarasco	50	114.9	Navaho	50	120.0
Walapai	35	115.2	Mayo	53	120.4
Cora	50	115.4	Yaqui	51	120.8
Tepehuane	40	116.1	Southern Ute	50	121.3
Pueblos	452	116.3	Opata	30	121.8
Otomi	50	116.4	Yuma	29	122.8
Nahua	49	116.6	Papago	50	123.4
Apache	166	117.0	Pima	53	123.5
Mohave	85	118.5	Maricopa	40	124.1

TOTAL FACIAL INDEX

	No.	Range	Mean	S. D.	C. V.
Papago	217	80-109	93.55±.23	5.10±.17	5.45±.18
Yaqui	100	75-104	90.20±.35	5.15	5.71
Zuñi	348	75-104	87.80±.17	4.60±.12	5.24±.13
Hopi	277	70-99	84.75±.19	4.65±.13	5.49±.16
Navaho	125		85.83		

Difference of Means in Terms of P. E.

Papago-Yaqui	8.00
Papago-Zuñi	20.10
Papago-Hopi	29.70

Other Southwestern groups:

	No.	Mean		No.	Mean
Apache	174	78.43	Maricopa	40	83.22
Walapai	35	78.88	Nahua	49	83.37
Mohave	85	80.15	Yuma	29	83.41
Cora	51	80.67	Southern Ute	50	83.48
Aztec	54	81.44	Mazahua	41	84.76
Navaho	50	81.58	Mayo	53	84.98
Tepehuane	40	81.95	Yaqui	52	85.16
Pueblos	452	81.96	Pima	53	85.53
Otomi	62	82.90	Opata	30	86.61
Tarasco	50	83.04	Papago	50	86.64

The Papago in general have long faces. Their rather immoderate facial length is largely due to a pronounced development of the mid-facial area, the nose particularly, and the lips secondarily. These traits outweigh the common sub-medium chin development.

Seltzer's groups are all shorter of face. Some of the Papago excess may be caused by difference in measuring procedure but certainly not all of it. The Yaqui average is closest to that of the Papago, although the differences are conspicuous. The Zuñi, Navaho, and Hopi are successively inferior to the Papago.

Hrdlička's data for comparable groups are all too different to result from sampling conditions. His Papago series is more than a centimeter lower than the writer's and he disagrees with Seltzer nearly as much. Much of this discrepancy must lie in differing measuring techniques. The distribution of Hrdlička's values, however, is still valuable for present purposes. It shows that the Papago exceed the Yaqui and that these two tribes are superior to the Navaho and Pueblo groups. So the direction of Hrdlička's values agrees with Seltzer's and the writer's.

The total facial index follows precisely the same trend. The Papago are decidedly leptoprosopic. The Yaqui have a significantly lower average, but are nevertheless relatively long-faced. The Zuñi show still more deficiency and belong to the upper mesoprosopic division. The Navaho and particularly the Hopi are successively broader-faced than the Papago.

Hrdlička's data are again not directly comparable, but the distribution of his groups confirms that of Seltzer and the writer. The Papago have the highest indices, the Yaqui follow, while the Pueblos and Navaho are farthest removed from the Papago.

UPPER FACE HEIGHT

	<i>No.</i>	<i>Range</i>	<i>Mean</i>	<i>S. D.</i>	<i>C. V.</i>
Papago	219	60-94	79.30±.22	4.90±.16	6.18±.20
Yaqui	100	60-84	73.20±.34	5.10	6.97
Zuñi	347	60-89	73.50±.18	4.85±.12	6.60±.17
Hopi	278	55-89	68.35±.20	4.85±.14	7.10±.17
Navaho	125		73.07		

Difference of Means in Terms of P. E.

Papago-Yaqui	15.07
Papago-Zuñi	20.42
Papago-Hopi	36.86

UPPER FACIAL INDEX

	<i>No.</i>	<i>Range</i>	<i>Mean</i>	<i>S. D.</i>	<i>C. V.</i>
Papago	217	43-69	55.28±.17	3.81±.12	6.89±.22
Yaqui	100	43-63	52.10±.24	2.54	6.79
Zuñi	347	40-63	51.20±.13	3.51±.09	6.86±.18
Hopi	278	37-60	47.27±.13	3.30±.09	6.98±.20
Navaho	125		49.16		

Difference of Means in Terms of P. E.

Papago-Yaqui	10.80
Papago-Zuñi	19.04
Papago-Hopi	37.41

The Papago are superior to other recorded groups in upper facial height. The nearest approach to them is the Yaqui average, although the difference is considerable. The Zuñi and Navaho share a nearly equal inferiority and the Hopi stand in greatest contrast to the Papago.

Comparisons of the upper facial index show a comparable distribution. The Papago are considerably longer-faced in relation to face breadth than are the neighboring tribes. The Yaqui average is more moderate, while the Zuñi, Navaho, and Hopi are successively more broad faced.

BIGONIAL BREADTH

	<i>No.</i>	<i>Range</i>	<i>Mean</i>	<i>S. D.</i>	<i>C. V.</i>
Papago	218	90-121	106.86±.28	6.20±.20	5.80±.19

Yaqui	100	94-125	109.10±.38	5.56	5.10
Zuñi	348	94-125	107.14±.20	5.56±.14	5.19±.13
Hopi	278	94-125	109.34±.24	5.92±.17	5.41±.15
Navaho	125		110.12		

Difference of Means in Terms of P. E.

Papago-Yaqui	4.75
Papago-Zuñi	0.81
Papago-Hopi	6.73

Other Southwestern groups:

	No.	Mean		No.	Mean
Tepehaune	40	102.1	Navaho	50	107.0
Otomi	62	103.0	Pima	53	107.6
Tarasco	50	103.9	Opata	31	107.8
Huichol	30	104.0	Mayo	53	107.8
Cora	53	104.4	Yaqui	52	107.8
Aztec	54	104.5	Mazahua	41	107.9
Walapai	35	104.6	Maricopa	40	109.9
Papago	50	106.7	Mohave	45	110.3
Nahua	50	106.8	Yuma	29	110.8
Pueblos	183	106.9	Apache	52	111.8
Southern Ute	50	107.0			

The Papago show less bigonial breadth than do the tribes recorded by Seltzer. The Zuñi most closely approach and the Yaqui and Hopi are about equally superior to the Papago. The greatest excess is seen in the Navaho.

According to Hrdlička, the same tribes show less variation from each other. His values indicate that the Papago have less jaw breadth than the others but that the Yaqui are slightly superior to the Navaho. The least of his averages occur among the Mexican tribes. The greatest jaw breadths in Hrdlička's series are among the Yuman groups and the Apache.

FRONTO-GONIAL INDEX

	No.	Range	Mean	S. D.	C. V.
Papago	218	80-119	99.90±.27	6.00±.19	6.01±.19
Yaqui	100	91-130	100.90±.51	7.60	6.98
Zuñi	348	86-130	103.50±.24	6.55±.17	6.33±.16
Hopi	278	86-125	104.85±.24	6.00±.17	5.72±.16
Navaho	125		101.88		

Difference of Means in Terms of P. E.

Papago-Yaqui	15.61
Papago-Zuñi	9.97
Papago-Hopi	13.70

ZYGO-GONIAL INDEX

	No.	Range	Mean	S. D.	C. V.
Papago	217	63-83	74.65±.17	3.81±.12	5.10±.17
Yaqui	100	67-87	77.60±.23	3.48	4.48
Zuñi	348	67-87	74.51±.13	3.57±.09	4.79±.12
Hopi	278	64-87	75.32±.14	3.51±.10	4.66±.13
Navaho	125		75.32		

Difference of Means in Terms of P. E.

Papago-Yaqui	10.30
Papago-Zuñi	0.65
Papago-Hopi	3.04

In relation to forehead width, the Papago jaw is narrower than most of the neighboring groups. The greatest contrast in this ratio occurs between the Papago and Yaqui; the average of the latter tribe indicates a rather extraordinary breadth. Both of the Pueblo tribes, according to Seltzer, have significantly greater forehead-jaw ratios than have the Papago—the Hopi more than the Zuñi. Navaho values average but slightly higher than Papago.

Jaw breadth relative to facial width does not set the Papago so far apart from the other tribes. They are nearly identical with the Zuñi; they differ more significantly from the Hopi and Navaho; while they are farthest removed from the relatively wide-jawed Yaqui.

NOSE HEIGHT

	No.	Range	Mean	S. D.	C. V.
Papago	219	52-71	61.06±.15	3.36±.11	5.50±.18
Yaqui	100	44-63	55.02±.25	3.76	6.83
Zuñi	348	36-71	55.82±.15	4.08±.10	7.31±.19
Hopi	278	36-63	50.50±.16	3.92±.11	7.76±.22
Navaho	75		54.84		

Difference of Means in Terms of P. E.

Papago-Yaqui	20.70
Papago-Zuñi	24.70
Papago-Hopi	48.20

Other Southwestern groups:

	No.	Mean		No.	Mean
Tarasco	50	48.8	Cora	53	49.9
Huichol	29	49.7	Tarahumare	23	50.1
Otomi	62	49.7	Mazahua	41	50.7
Tepecano	25	49.8	Nahua	50	50.8
Aztec	54	49.9	Tepehuane	40	51.2

Walapai	35	51.3	Maricopa	40	52.9
Pueblos	377	51.6	Opata	31	53.0
Mayo	53	52.0	Yuma	29	53.3
Papago	50	52.2	Navaho	50	53.9
Mohave	85	52.4	Pima	53	54.0
Yaqui	52	52.5	Southern Ute	50	54.8
Apache	166	52.8			

NOSE BREADTH

	No.	Range	Mean	S. D.	C. V.
Papago	219	31-51	40.46±.14	2.97±.10	7.43±.24
Yaqui	100	34-51	42.29±.23	3.42	8.09
Zuñi	346	31-48	37.67±.10	2.73±.07	7.25±.19
Hopi	278	31-51	39.86±.14	3.39±.10	8.50±.24
Navaho	75		38.31		

Difference of Means in Terms of P. E.

Papago-Yaqui	6.80
Papago-Zuñi	16.21
Papago-Hopi	3.03

Other Southwestern groups:

	No.	Mean		No.	Mean
Pueblos	377	39.1	Papago	50	41.7
Apache	166	40.1	Mayo	53	41.7
Otomi	82	40.3	Cora	53	41.8
Navaho	50	40.4	Pima	53	42.2
Mazahua	41	40.7	Southern Ute	50	42.4
Aztec	54	41.1	Mohave	85	42.5
Yaqui	52	41.2	Opata	30	42.5
Nahua	50	41.3	Tepehuane	40	42.5
Walapai	35	41.4	Yuma	29	43.0
Tarasco	50	41.6	Maricopa	40	43.2
Tepecano	25	41.6			

NASAL INDEX

	No.	Range	Mean	S. D.	C. V.
Papago	219	52-83	65.90±.25	5.44±.18	8.25±.27
Yaqui	100	60-95	77.38±.46	6.76	8.74
Zuñi	346	52-91	67.74±.23	6.48±.17	9.57±.25
Hopi	278	60-111	79.58±.37	9.04±.26	11.36±.32
Navaho	75		72.93		

Difference of Means in Terms of P. E.

Papago-Yaqui	21.97
Papago-Zuñi	5.42
Papago-Hopi	30.60

Other Southwestern groups:

	No.	Mean		No.	Mean
Navaho	50	74.9	Apache	166	75.9
Pueblos	377	75.7	Southern Ute	50	77.5

Pima	53	78.1	Otomi	62	81.1
Yaqui	54	78.4	Nahua	50	81.3
Papago	50	79.9	Maricopa	40	81.6
Opata	30	80.1	Aztec	54	82.2
Mayo	53	80.2	Huichol	29	82.5
Mazahua	41	80.2	Tepehuane	40	83.0
Yuma	29	80.6	Cora	53	84.8
Walapai	35	80.8	Tarasco	50	85.2
Mohave	85	81.1			

The writer's data describe the Papago as strikingly long-nosed. Seltzer's material locates the shortest noses among the Hopi, followed in ascending order by the Navaho, Yaqui, and Zuñi.

Hrdlička's averages are all a good deal lower than Seltzer's or the writer's. Probably the location of *nasion* accounts for a good deal of this disagreement. According to Hrdlička, the highest nasal lengths occur among the Southern Ute, the Pima, and the Navaho, while the shortest noses cluster among the south central Mexican groups such as the Tarasco, Huichol, Otomi, and Aztec.

The Papago, according to the writer, are significantly broader-nosed than Seltzer's Zuñi, Hopi, and Navaho, but they are inferior to the Yaqui mean by nearly two millimeters. Hrdlička's data are somewhat at odds in that they indicate Papago nose breadth as slightly greater than Yaqui. His Navaho and Pueblo series, however, show a position lower in the series similar to that of the Papago. Hrdlička's Pueblo and Athapaskan tribes are located at the lower limit of the range, while the highest averages are among the Maricopa and Yuma.

The Papago are definitely leptorrhine, significantly more so than any of the tribes reported by Seltzer. This low mean ratio is essentially due to their excessive nasal length. Among Seltzer's data, the Hopi stand in most striking contrast to the Papago. The Hopi high ratio seems due to lack of nasal length more than excess of breadth. Likewise the Yaqui, as recorded by Seltzer, are relatively much broader-nosed than the Papago. The Navaho and Zuñi are successively closer to the Papago average, although they both show significant differences.

All of Hrdlička's ratios are a good deal higher than Seltzer's or the writer's. According to Hrdlička, the relatively narrower noses cluster in the north among the Athapascans, Pueblos, and Utes, while some of the highest nasal ratios occur toward the south.

MORPHOLOGICAL OBSERVATIONS ON THE TRIBES

The qualitative data utilized for comparison with the writer's Papago studies are wholly those of Dr. Carl Seltzer; his is the only material available on other Southwestern groups. The handicaps of comparing morphological observations gleaned by two different investigators is recognized, and every effort has been made to reduce the personal equation to a minimum. Fortunately, Seltzer and the writer are not strangers to each other and some of the discrepancies have been ironed out between them. Most differences of opinion which remain are recognized as such by the writer, and will be dealt with accordingly in the following discussion.

Environmental influences that are known to distort certain comparisons are, on the whole, not important in these studies. The general habitat of the Southwest is sufficiently homogeneous to eliminate external influences great enough to invalidate the data.

Factors of age have of necessity been disregarded in the general comparisons. Seltzer's records did not include the ages of his subjects. Some of the comparisons, as a result, are of less value than if age considerations could have been included.

SKIN COLOR: FOREHEAD

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Brunet					
Number	0	0	0	1	0
Percent	0.00	0.00	0.00	0.36	0.00
Swarthy					
Number	0	0	6	1	1
Percent	0.00	0.00	1.72	0.36	0.80
Red-brown					
Number	0	2	113	125	50
Percent	0.00	2.00	32.47	45.29	40.00
Light brown					
Number	0	8	176	113	51
Percent	0.00	8.00	50.57	40.94	40.80
Light yellow brown					
Number	0	0	0	0	0
Percent	0.00	0.00	0.00	0.00	0.00

Yellow brown					
Number	4	12	29	32	12
Percent	1.82	12.00	8.33	11.59	9.60
Medium brown					
Number	175	46	22	4	11
Percent	79.91	46.00	6.32	1.45	8.80
Chocolate					
Number	40	32	2	0	0
Percent	18.26	32.00	0.57	0.00	0.00
Totals	219	100	348	276	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Brunet	—	—	1	—
Swarthy	—	3	1	1
Red brown	2	19	22	13
Light brown	4	27	20	20
Yellow brown	4	5	6	4
Medium brown	8	36	41	28
Chocolate	3	9	10	10

All the observation on skin color made by the writer are based on the von Luschan color scale.¹

Skin color of the exposed areas varies throughout the Southwest from brunet to chocolate. The lighter shades of the range are meagerly represented. The position of the Papago, who are mostly medium brown, is between the darker skinned Yaqui to the south and the lighter Pueblo and Navaho groups to the north and northwest. The Papago appear to be closer to the Yaqui than to the northern groups so that there is something of a north-south contrast in skin color.

SKIN COLOR: BREAST

	Papago	Yaqui	Zuñi	Hopi	Navaho
Brunet					
Number	0	0	15	1	0
Percent	0.00	0.00	5.46	0.36	0.00
Swarthy					
Number	1	0	64	5	8
Percent	0.46	0.00	18.39	1.81	6.40

¹ Numerical equivalents on the von Luschan scale:

Brunet—7, 8, 9
 Swarthy—10, 11
 Red brown—12, 14, 16
 Light brown—15, 17, 18
 Light yellow brown—3, 5
 Yellow brown—19, 20, 6
 Medium brown—21, 25
 Chocolate—26, 29

Red brown					
Number	63	11	169	61	43
Percent	28.74	11.00	48.56	22.10	34.40
Light brown					
Number	152	19	87	161	58
Percent	69.41	19.00	25.00	58.33	46.40
Light yellow brown					
Number	3	0	0	1	0
Percent	1.37	0.00	0.00	0.36	0.00
Yellow brown					
Number	0	32	3	40	12
Percent	0.00	32.00	0.86	14.49	9.60
Medium brown					
Number	0	36	6	7	4
Percent	0.00	36.00	1.72	2.57	3.20
Chocolate					
Number	0	2	0	0	0
Percent	0.00	2.00	0	0	0
Totals	219	100	348	276	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Brunet	—	6	1	—
Swarthy	1	12	2	3
Red brown	6	7	2	1
Light brown	14	16	3	6
Light yellow brown	2	2	1	2
Yellow brown	10	2	10	5
Medium brown	11	3	4	3
Chocolate	2	—	—	—

The color of the unexposed parts of the body shows the same general tendencies as the distribution of forehead color, but in attenuated form. Again the Papago are lighter than the Yaqui and darker than the northern groups.

FRECKLES

	Papago	Yaqui	Zuñi	Hopi	Navaho
Absent					
Number	205	98	312	273	115
Percent	93.61	98.00	89.66	98.20	92.00
Few					
Number	14	2	33	5	9
Percent	6.39	2.00	9.48	1.80	7.20
Medium					
Number	0	0	3	0	1
Percent	0.00	0.00	0.86	0.00	0.80
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent	3	2	3	0
Few	3	2	3	0
Medium	—	2	—	1

The infrequent occurrence of freckles among the South-western Indians is consistent with their relative purity of blood as far as admixture with White strains is concerned.

. MOLES

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
Number	9	40	192	100	62
Percent	4.54	40.82	55.17	65.04	49.60
Few					
Number	180	52	146	73	53
Percent	90.91	53.06	41.95	29.67	42.40
Many					
Number	9	6	10	13	10
Percent	4.54	6.12	2.87	5.28	8.00
Totals	198	98	348	246	125

- *Difference of Means in Terms of P. E.*

	PY	PZ	PH	PN
Absent	10	24	26	14
Few	10	21	25	14
Many	0	1	0	1

The uncommon high frequency of moles among the Papago is curious. Relatively few lacked moles altogether; just a few had many; but over 90 percent had some. The other tribes tabulated show a much more moderate occurrence of these pigmented naevi. Since moles are commonly believed to be congenital and hereditary, though they may not appear until long after birth, their relative abundance among the Papago may be interpreted as a physical variation peculiar to that group.

HAIR FORM

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Straight					
Number	203	97	343	276	122
Percent	92.69	97.00	98.56	99.64	97.60
Low waves					
Number	16	2	5	1	3
Percent	7.31	2.00	1.44	0.36	2.40
Deep waves					
Number	0	1	0	0	0
Percent	0.00	1.00	0.00	0.00	0.00

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Straight	3	4	5	3
Low wave	3	4	5	3
Deep wave	1	—	—	—

Straight hair among American Indians is the rule and the Papago do not differ from this condition. The Papago exhibit a considerable excess of low waves over the other Southwestern groups.

HAIR TEXTURE

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Coarse					
Number	205	7	10	8	5
Percent	93.61	7.00	2.87	2.90	4.00
Medium					
Number	14	25	82	49	25
Percent	6.39	25.00	23.65	17.75	20.00
Fine					
Number	0	68	256	219	95
Percent	0.00	68.00	73.56	79.35	76.00
Totals	219	100	348	276	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Coarse	42	71	69	55
Medium	5	9	5	5
Fine	21	46	48	29

The great disparity between the Papago and the tribes investigated by Seltzer represents a difference in judgment between Seltzer and the writer and not a true inter-tribal difference.

HEAD HAIR: QUANTITY

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Thin					
Number	8	4	62	63	22
Percent	3.65	4.00	17.82	22.62	17.60
Medium					
Number	175	48	267	209	94
Percent	79.91	48.00	76.72	75.18	75.20
Thick					
Number	36	48	19	6	9
Percent	16.44	48.00	5.46	2.16	7.20
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Thin	0	8	9	5
Medium	8	1	1	1
Thick	8	5	7	3

The majority of Papago show a moderate amount of head hair with a secondary tendency toward thick hair. Seltzer's data show that the Yaqui possess considerably more thick hair, while the northern groups are distinguished from both the

Papago and Yaqui by significantly higher percentages of thin hair. Since age factors are not included in this comparison, the value of the data is limited.

BALDNESS

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
Number	210	98	319	261	122
Percent	95.89	98.00	91.67	93.88	97.60
Slight					
Number	4	1	24	12	2
Percent	1.83	1.00	6.90	4.32	1.60
Medium					
Number	5	1	4	4	1
Percent	2.28	1.00	1.15	1.44	0.80
Pronounced					
Number	0	0	1	1	0
Percent	0.00	0.00	0.29	0.36	0.00
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

PY PZ PH PN

Absent	1	1	0	1
Slight	0	4	2	0
Medium	1	1	1	1
Pronounced	-	1	1	-

Lack of age data diminishes the value of this trait, although it clearly demonstrates that neither the Papago nor any of the other Southwestern Indians have a frequent tendency toward hair loss.

BEARD: QUANTITY

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Very sparse					
Number	147	69	339	273	124
Percent	67.12	69.00	97.41	98.20	99.20
Sparse					
Number	58	22	8	5	0
Percent	26.48	22.00	2.30	1.80	0.00
Medium					
Number	14	8	1	0	1
Percent	6.39	8.00	0.29	0.00	0.80
Pronounced					
Number	0	1	0	0	0
Percent	0.00	1.00	0.00	0.00	0.00
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

PY PZ PH PN

Very sparse	0	13	14	14
Sparse	1	11	11	12
Medium	0	5	5	3
Pronounced	1	-	-	-

There is an interesting similarity in beard quantity between the Papago and Yaqui. These tribes exhibit beards fairly commonly, though of sparse nature. This tendency sets the Papago and Yaqui apart from the Zuñi, Hopi, and Navaho, who are considerably less endowed with face hair.

BODY HAIR: QUANTITY

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
Number	203	99	344	276	121
Percent	92.69	99.00	98.85	99.28	96.80
Slight					
Number	16	1	3	2	4
Percent	7.31	1.00	0.86	0.72	3.20
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent	4	4	5	2
Slight	4	4	5	2

The great majority of Papago are relatively glabrous, as are most American Indians. At the same time, they show more frequent development of a small amount of body hair than do the groups recorded by Seltzer.

GRAYNESS: HEAD

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
Number	146	78	272	212	111
Percent	66.67	78.00	78.16	76.26	88.80
Slight					
Number	57	13	60	56	10
Percent	26.03	13.00	17.24	20.14	8.00
Medium					
Number	12	4	13	7	2
Percent	5.48	4.00	3.74	2.52	1.60
Pronounced					
Number	4	5	3	3	2
Percent	1.83	5.00	0.86	1.08	1.60

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent	3	4	3	7
Slight	4	4	2	6
Medium	1	1	2	3
Pronounced	2	2	1	0

GRAYNESS: BEARD

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
Number	158	83	335	257	123
Percent	72.48	83.00	92.26	92.45	98.40
Slight					
Number	43	10	12	21	1
Percent	19.72	10.00	3.45	7.55	0.80
Medium					
Number	15	3	1	0	1
Percent	6.88	3.00	0.29	0.00	0.80
Pronounced					
Number	2	4	0	0	0
Percent	0.92	4.00	0.00	0.00	0.00
Totals	218	100	348	278	125

Difference of Means in Terms of P. E.

	<i>PY</i>	<i>PZ</i>	<i>PH</i>	<i>PN</i>
Absent	4	11	8	11
Slight	3	8	5	10
Medium	2	5	5	4
Pronounced	2	2	2	2

The Papago have a somewhat higher incidence of hair grayness than the other Southwestern tribes, although they are exceeded by the Yaqui in the pronounced development of this trait. Absence of age data again obscures the significance of these differences.

Beard grayness follows the same trend, although less grayness is indicated on the face than on the head for each tribe.

HAIR COLOR: HEAD

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Black					
Number	219	100	343	277	122
Percent	100.00	100.00	99.13	99.64	97.60
Dark brown					
Number	0	0	3	1	3
Percent	0.00	0.00	0.87	0.36	2.40
Totals	219	100	346	278	125

Difference of Means in Terms of P. E.

	<i>PY</i>	<i>PZ</i>	<i>PH</i>	<i>PN</i>
Black	—	2	1	2
Dark brown	—	2	1	2

HAIR COLOR: BEARD

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Black	219	no data	no data	no data	125

With no exception among the Papago and with minor devi-

ation among other Southwestern groups, hair color is uniformly black.

EYE COLOR					
	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Black					
Number	0	53	2	16	41
Percent	0.00	53.00	0.57	5.76	32.80
Dark brown					
Number	175	47	314	244	91
Percent	79.91	47.00	90.23	87.77	64.80
Dark-light brown					
Number	44	0	27	18	3
Percent	20.09	0.00	7.76	6.47	2.40
Light brown					
Number	0	0	5	0	0
Percent	0.00	0.00	1.44	0.00	0.00
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Black	15	2	6	11
Dark brown	15	4	4	4
Dark-light brown	11	5	5	8
Light brown	—	3	—	—

Papago eyes are roughly four-fifths dark brown and one-fifth dark-light brown. The writer's observations are at odds with those of Seltzer, the latter designating as "black" numerous instances that the writer would call "dark brown."

One unmistakable condition is indicated by the data: dark eyes are the rule among all the groups.

EXTERNAL EYEFOLDS					
	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
Number	122	64	250	199	82
Percent	55.71	64.00	71.84	71.58	65.60
Submedium					
Number	40	11	40	45	21
Percent	18.26	11.00	11.49	16.19	16.80
Medium					
Number	32	10	35	30	14
Percent	14.61	10.00	10.05	10.79	11.20
Pronounced					
Number	25	15	23	4	8
Percent	11.41	15.00	6.61	1.44	6.40
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent	2	5	5	2
Submedium	2	3	0	0
Medium	1	2	1	1
Pronounced	1	2	6	2

External eyefolds occur among the Papago in some degree in about 45 percent of cases. The groups observed by Seltzer show somewhat lesser occurrence of this trait. The total incidence for the Yaqui is 36 percent. The Pueblo tribes are farthest removed from the Papago. With no age data, the significance of these comparisons is limited.

MEDIAN EYEFOLDS

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
Number	130	66	268	237	95
Percent	59.33	66.00	77.23	85.25	76.00
Submedium					
Number	41	24	50	38	20
Percent	18.73	24.00	14.41	13.67	16.00
Medium					
Number	30	4	20	3	10
Percent	13.70	4.00	5.76	1.08	8.00
Pronounced					
Number	18	6	9	0	0
Percent	8.23	6.00	2.59	0.00	0.00
Totals	219	100	347	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent	1	6	9	4
Submedium	1	1	2	0
Medium	4	4	7	3
Pronounced	1	4	6	6

Median eyefolds are fairly common among the Papago, among whom they are present in some degree in about 40 percent of cases. The Yaqui most closely resemble the Papago in this trait, with a total incidence of 34 percent. More removed are the Pueblo and Navaho groups, all of whom show lesser developments of the median fold.

INTERNAL EYEFOLDS

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
Number	197	91	330	261	120
Percent	89.95	91.92	95.10	94.22	96.00
Submedium					
Number	14	5	16	16	4
Percent	6.40	5.05	4.61	5.78	3.20
Medium					
Number	5	4	0	0	1
Percent	2.28	3.03	0.00	0.00	0.80

Pronounced					
Number	3	0	1	0	0
Percent	1.37	0.00	0.29	0.00	0.00
Totals	219	99	347	277	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent	1	3	2	3
Submedium	0	1	0	2
Medium	0	3	3	1
Pronounced	2	1	2	2

A much lower frequency of internal eyefolds is apparent among the Papago, as well as the tribes recorded by Seltzer, and a more homogeneous condition also is present. The Papago incidence of this trait is somewhat higher than it is among the Pueblo and Navaho groups. Between the Papago and Yaqui there is close similarity.

It should be appended, perhaps, that this general low frequency of internal eyefolds applies only to the adults. Among the immature, the Mongoloid type of eyefold is common, much more so than it is among Caucasians. The subsequent loss of the eyefold agrees with a corresponding increase in nasal root height.

EYE OBLIQUITY

	Papago	Yaqui	Zuni	Hopi	Navaho
Absent					
Number	46	6	37	24	10
Percent	21.00	6.00	10.63	8.63	8.00
Submedium					
Number	113	57	259	213	93
Percent	51.60	57.00	74.43	76.62	74.40
Medium					
Number	54	29	49	35	19
Percent	24.66	29.00	14.08	12.59	15.20
Pronounced					
Number	6	8	3	5	3
Percent	2.74	8.00	0.86	1.80	2.40
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent	6	4	5	5
Submedium	1	8	8	6
Medium	1	4	5	3
Pronounced	2	2	1	0

A certain amount of upward tilt at the lateral portion of the eye is common to the majority of Papago. They exhibit,

however, a lesser frequency of tilt than do the groups described by Seltzer's data.

EYE OPENING HEIGHT

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Submedium					
Number	173	37	253	102	66
Percent	79.00	37.00	72.70	36.69	52.80
Medium					
Number	46	58	92	173	56
Percent	21.00	58.00	26.44	62.23	44.80
Pronounced					
Number	0	5	3	3	3
Percent	0.00	5.00	0.86	1.08	2.40
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Submedium	11	2	15	7
Medium	9	2	15	6
Pronounced	3	2	2	2

The eyes of the Papago tend strongly toward submedium opening height. How much of this is owing to environmental influences cannot be determined, but in such an area of strong and prolonged sunshine in a desert country as the Papago inhabit, external factors certainly must be considered.

Compared with other Southwestern groups, the Papago are most like the Zuñi, whom they closely approach. They differ more strikingly from the other tribes, particularly the Hopi and Yaqui.

EYEBROW THICKNESS

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Submedium					
Number	68	32	182	126	61
Percent	31.05	32.00	52.30	45.32	48.80
Medium					
Number	140	53	150	131	50
Percent	63.95	53.00	43.10	47.12	40.00
Pronounced					
Number	11	12	16	19	14
Percent	5.02	12.00	4.60	6.83	11.20
Very pronounced					
Number	0	3	0	2	0
Percent	0.00	3.00	0.00	0.72	0.00
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Submedium	0	7	4	4
Medium	2	7	5	6
Pronounced	2	0	1	2
Very pronounced	2	-	2	-

Eye-brow thickness on the whole tends to medium and submedium development among the Papago as well as the other tribes. The Papago have the highest incidence of the medium category and they are almost identical with the Yaqui in the submedium designation.

EYEBROW CONCURRENCY

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
Number	175	83	304	246	108
Percent	79.91	83.00	87.36	88.49	86.40
Submedium					
Number	39	16	34	30	15
Percent	17.81	16.00	9.77	10.79	12.00
Medium					
Number	5	1	10	2	2
Percent	2.28	1.00	2.87	0.72	1.60
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent	0	2	3	2
Submedium	0	3	3	2
Medium	1	0	2	0

Concurrency of the eyebrows is relatively little developed among the Papago; none possess it to a pronounced degree, and few show moderate development. The Papago show somewhat more concurrency than the other tribes. The Yaqui are close to the Papago, while the Pueblo and Navaho groups are slightly less developed in this trait.

FOREHEAD HEIGHT

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Submedium					
Number	41	4	19	18	1
Percent	18.72	4.00	5.46	6.47	0.80
Medium					
Number	142	66	238	235	83
Percent	64.84	66.00	68.39	84.53	66.40
Pronounced					
Number	36	30	91	25	41
Percent	16.44	30.00	26.15	8.99	32.80
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Submedium	6	6	6	9
Medium	0	1	7	0
Pronounced	4	4	3	4

Foreheads of medium height are shown by the majority of Papago and the remainder are almost equally divided between individuals of low and high foreheads. Seltzer's data describe the other Southwestern tribes as considerably less low-headed in the forehead region, with the exception of the Hopi.

FOREHEAD SLOPE

	Papago	Yaqui	Zuñi	Hopi	Navaho
Foreward					
Number	0	0	1	0	0
Percent	0.00	0.00	0.29	0.00	0.00
Absent					
Number	16	13	52	77	32
Percent	7.30	13.00	14.94	27.70	25.60
Slight					
Number	80	46	184	162	71
Percent	36.50	46.00	52.87	58.27	56.80
Medium					
Number	105	35	98	37	21
Percent	47.95	35.00	28.16	13.31	16.80
Pronounced					
Number	18	5	13	2	1
Percent	8.23	5.00	3.74	0.72	0.80
Very pronounced					
Number	0	1	0	0	0
Percent	0.00	1.00	0.00	0.00	0.00
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Foreward	—	1	—	—
Absent	2	4	9	4
Slight	2	5	7	5
Medium	3	6	13	9
Pronounced	1	3	5	5
Very pronounced	1	—	—	—

More than half of the Papago have foreheads that recede to a medium or pronounced degree. Only 7.3 percent show no slope, so that on the whole, the tribe has a low incidence of steep foreheads. The Yaqui are nearest to the Papago in slope of forehead. The Pueblo and Navaho groups show significantly lower frequencies of moderate and pronounced slope and correspondingly higher incidence of straight foreheads.

BROW RIDGES

	Papago	Yaqui	Zuñi	Hopi	Navaho
Absent					
Number	8	0	2	4	1
Percent	3.65	0.00	0.57	1.44	0.80

Submedium					
Number	139	11	139	68	35
Percent	63.47	11.00	39.94	24.46	28.00
Medium					
Number	66	31	173	167	65
Percent	30.14	31.00	49.71	60.07	52.00
Pronounced					
Number	6	43	33	36	22
Percent	2.74	43.00	9.48	12.95	17.60
Very pronounced					
Number	0	15	1	3	2
Percent	0.00	15.00	0.29	1.08	1.60
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent	4	3	2	2
Submedium	17	16	13	10
Medium	0	7	10	5
Pronounced	11	5	6	6
Very pronounced	6	1	2	2

The brow ridge development of the Papago is described as less than moderate in about two-thirds of cases. The contrasts between this description and those of Seltzer's groups invites suspicion. The writer believes that much of the difference indicated by the above table is due to personal differences in interpretation by the observers. Judgments based on the data are therefore considered ill-advised.

TEMPORAL FULLNESS

	Papago	Yaqui	Zuñi	Hopi	Navaho
Submedium					
Number	154	72	251	225	69
Percent	70.32	72.00	72.33	81.52	55.20
Medium					
Number	51	24	94	49	52
Percent	23.92	24.00	27.09	17.75	41.60
Pronounced					
Number	14	4	2	2	4
Percent	6.39	4.00	0.58	0.72	3.20
Totals	219	100	347	276	125

* *Difference of Means in Terms of P. E.*

	PY	PZ	PH	PN
Submedium	0	0	4	4
Medium	0	1	2	5
Pronounced	1	2	4	2

The Papago head is commonly characterized by less than moderate fullness in the temporal region. According to Seltzer's data, the Papago share this type of development with the

Yaqui, Zuñi, and Hopi; the Hopi in particular show this characteristic in most developed form. Farther removed from the Papago are the Navaho with their comparatively equal distribution of submedium and medium temporal fullness.

NASION DEPRESSION

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
Number	12	6	3	1	1
Percent	5.48	6.06	0.86	0.36	0.30
Very small					
Number	40	16	66	56	22
Percent	18.27	16.16	19.97	20.14	17.60
Small					
Number	58	13	97	68	33
Percent	26.48	13.13	27.84	24.46	26.40
Medium					
Number	89	46	161	118	61
Percent	40.63	46.46	46.26	42.45	48.80
Pronounced					
Number	20	17	20	34	8
Percent	9.18	17.17	5.75	12.23	6.40
Very pronounced					
Number	0	1	1	1	1
Percent	0.00	1.01	0.29	0.36	0.00
Totals	219	99	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent	0	4	4	4
Very small	0	0	0	0
Small	4	0	0	0
Medium	1	1	0	2
Pronounced	2	2	1	1
Very pronounced	1	1	1	-

A strongly depressed nasion is not characteristic of the Papago; the majority show less than average depression. Other Southwestern tribes also range largely between medium and small nasal depression.

NASAL ROOT HEIGHT

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Very low					
Number	0	1	5	4	3
Percent	0.00	1.00	1.44	1.44	2.40
Low					
Number	12	10	24	34	10
Percent	5.48	10.00	6.90	12.23	8.00
Medium					
Number	137	59	193	176	78
Percent	62.56	59.00	55.46	63.31	62.40

High					
Number	70	26	123	62	34
Percent	31.96	26.00	35.34	22.30	27.20
Very high					
Number	0	4	3	2	0
Percent	0.00	4.00	0.86	0.72	0.00
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Very low	1	3	2	2
Low	1	1	4	1
Medium	0	2	0	0
High	1	1	3	1
Very high	3	3	2	-

Nearly all of the Papago root heights are in either medium or high classes; medium heights exceed high ones by about two to one. Seltzer's data on the other Southwestern tribes ascribes somewhat more scatter on either side of the average class, but the general trend toward moderate and high nasal roots is present as among the Papago.

NASAL ROOT BREADTH

	Papago	Yaqui	Zuñi	Hopi	Navaho
Very small					
Number	0	11	26	39	9
Percent	0.00	11.00	7.47	14.03	7.20
Small					
Number	1	15	80	50	18
Percent	0.46	15.00	22.99	17.99	14.40
Medium					
Number	87	59	233	186	94
Percent	39.76	59.00	66.95	66.91	74.20
Broad					
Number	131	13	9	2	4
Percent	59.82	13.00	2.59	0.72	3.20
Very broad					
Number	0	2	0	1	0
Percent	0.00	2.00	0.00	0.36	0.00
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Very small	5	7	10	4
Small	5	14	11	6
Medium	4	9	9	10
Broad	14	24	26	18
Very broad	2	-	1	-

Broad nasal roots seem to characterize the majority of Papago; they are divided between broad and medium types

by a sixty-forty ratio. Comparisons with other tribes are believed by the writer to be distorted by disagreement of judgment. It is suggested that the Papago are not as divergent from the other tribes as the table indicates and that they share a higher frequency of broad nasal roots with the Yaqui as opposed to higher percentages of smaller breadths among the Pueblo and Navaho tribes.

NASAL BRIDGE HEIGHT

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Low					
Number	5	2	7	12	5
Percent	2.28	2.00	2.02	4.32	4.00
Medium					
Number	190	29	90	120	45
Percent	86.76	29.00	25.94	43.17	36.00
High					
Number	24	53	219	133	66
Percent	10.96	53.00	63.11	47.84	52.80
Very High					
Number	0	16	31	13	9
Percent	0.00	16.00	8.93	4.68	7.20
Totals	219	100	347	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Low	0	0	1	1
Medium	15	27	17	15
High	11	24	14	13
Very high	6	8	5	4

A low nasal bridge is not common among the Papago adult men; nearly all fall into the medium and high classes. The place of the Papago among the tribes recorded by Seltzer is probably not as removed as indicated by the table. The writer feels that he has overworked the medium category mostly at the expense of the designation "high."

NASAL BRIDGE BREADTH

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Narrow					
Number	1	5	19	9	4
Percent	0.46	5.00	5.48	3.24	3.24
Medium					
Number	142	64	272	230	100
Percent	64.84	64.00	78.39	82.73	80.00
Broad					
Number	76	30	54	39	19
Percent	34.70	30.00	15.56	14.03	15.20

Very broad					
Number	0	1	1	0	2
Percent	0.00	1.00	0.29	0.00	1.60
Totals	219	100	347	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Narrow	3	4	3	2
Medium	0	5	6	4
Broad	1	7	7	6
Very broad	1	1	-	2

Noses of moderate breadth are in the majority among the Papago, although a strong secondary tendency toward broad noses is apparent. The Papago show close resemblance to the Yaqui in this trait and they depart significantly from the Pueblos and Navaho who have lower frequencies of broad nose bridges.

NASAL PROFILE

	Papago	Yaqui	Zuñi	Hopi	Navaho
Concave					
Number	0	2	6	4	4
Percent	0.00	2.00	1.73	1.44	3.20
Straight					
Number	87	13	155	96	38
Percent	39.73	13.00	44.67	34.53	30.40
Convex					
Number	132	85	186	178	83
Percent	60.27	85.00	53.60	64.03	66.40
Totals	219	100	347	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Concave	2	3	2	3
Straight	8	1	1	2
Convex	7	2	1	1

The nasal profile of the Papago varies between convex and straight. The convex type is in the majority. No cases of a concave nose were observed by the writer among the adult males. In this trait the Papago agree with other Southwestern tribes, all of whom show a predominance of convex profile.

NASAL TIP THICKNESS

	Papago	Yaqui	Zuñi	Hopi	Navaho
Thin					
Number	0	8	29	15	11
Percent	0.00	8.00	8.33	5.40	8.80
Medium					
Number	105	81	276	246	104
Percent	47.95	81.00	79.31	88.49	83.20

Thick					
Number	114	11	40	16	9
Percent	52.05	11.00	11.49	5.76	7.20
Very thick					
Number	0	0	3	1	1
Percent	0.00	0.00	0.86	0.36	0.80
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Thin	4	8	5	5
Medium	9	11	16	11
Thick	13	16	19	16
Very thick	-	2	1	1

The nasal tip of the Papago is rather evenly divided between thick and medium categories. A thick tip is considerably more frequent among the Papago than among the groups recorded by Seltzer, although the writer believes some of the differences stem from the personal equations of the observers.

NASAL TIP INCLINATION

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Up medium					
Number	18	11	24	6	13
Percent	8.23	11.00	6.90	2.16	10.40
Up slightly					
Number	153	73	250	186	77
Percent	69.86	73.00	71.84	66.91	61.60
Horizontal					
Number	26	9	21	40	18
Percent	11.87	9.00	6.03	14.39	14.40
Down slightly					
Number	15	6	49	43	14
Percent	6.85	6.00	14.08	15.47	11.20
Down medium					
Number	7	1	4	3	3
Percent	3.20	1.00	1.15	1.08	2.40
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Up medium	1	0	4	0
Up slightly	0	0	1	2
Horizontal	1	3	1	0
Down slightly	0	4	4	1
Down medium	2	2	2	0

Most of the Papago noses are slightly tilted at the tip and the other Southwestern tribes show a similar tendency. The only significant departure from this pattern is among

the Pueblo and Navaho groups who more frequently have slightly depressed nasal tips.

NASAL SEPTUM

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Straight, Concave					
Number	16	3	97	36	19
Percent	7.31	3.00	28.20	13.14	15.20
Convex					
Number	203	97	247	238	106
Percent	92.69	97.00	71.81	86.86	84.80
Totals	219	100	344	274	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Straight, Concave	2	10	3	3
Convex	2	10	3	3

A convex nasal septum is characteristic of the bulk of Papago and of the neighboring tribes. The Yaqui exceed the Papago in nasal septum convexity, and the Pueblo and Navaho groups show somewhat higher frequencies of straight or concave septa.

NASAL WINGS

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Compressed					
Number	1	2	11	8	3
Percent	0.46	2.00	3.22	2.88	2.40
Medium					
Number	41	13	87	143	52
Percent	18.72	13.00	25.44	51.44	41.60
Flaring					
Number	177	85	244	127	70
Percent	80.82	85.00	71.34	45.68	56.00
Totals	219	100	342	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Compressed	1	3	3	1
Medium	1	2	12	6
Flaring	1	3	13	7

Flaring nasal wings are much the more common type among the Papago. Comparisons with other Southwestern tribes are various. Nearest the Papago are the Yaqui, who somewhat exceed the Papago in flaring nostrils. Of the groups to the north, the Zuñi are closest to the Papago in nostril flare. The Hopi and Navaho show considerably lower incidence of flaring alae.

NOSTRIL VISIBILITY: FRONTAL

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
Number	33	14	53	27	15
Percent	15.07	14.00	15.27	9.71	12.00
Slight and moderate					
Number	152	67	263	231	101
Percent	69.41	67.00	75.79	83.09	80.80
Pronounced					
Number	34	19	31	20	9
Percent	15.52	19.00	8.93	7.19	7.20
Totals	219	100	237	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent	0	0	2	1
Slight and moderate	0	2	5	3
Pronounced	1	3	4	3

Some nostril visibility from the front is found in the majority of Papago. Good agreement obtains between the Papago and Yaqui, while the northern people show lesser frequencies of the pronounced condition.

NOSTRIL VISIBILITY: LATERAL

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
Number	24	11	17	24	11
Percent	10.96	11.22	4.91	8.70	8.80
Present					
Number	195	87	329	252	114
Percent	89.04	88.78	95.09	91.30	91.20
Totals	219	98	346	276	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent	0	3	1	0
Present	0	3	1	0

Lateral exposure of the nostrils is present in the bulk of Papago and other Southwestern tribes.

NOSTRIL SHAPE

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Thin					
Number	3	2	20	2	5
Percent	1.37	2.00	6.94	0.72	4.00
Medium					
Number	161	97	316	272	120
Percent	73.52	97.00	91.33	98.19	96.00

Round					
Number	55	1	6	3	0
Percent	25.11	1.00	1.73	1.08	0.00
Totals	219	100	346	277	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Thin	0	5	1	2
Medium	10	7	11	9
Round	11	11	11	12

Nearly all the nostrils of the Papago are medium and round in shape. The groups represented by Seltzer's data show a greater preponderance of the medium variety.

NOSTRIL AXES

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Parallel					
Number	3	0	1	1	1
Percent	1.37	0.00	0.29	0.37	0.80
Slightly oblique					
Number	112	26	90	185	46
Percent	51.14	26.53	25.94	67.77	36.80
Medium oblique					
Number	103	72	247	84	77
Percent	47.03	73.47	71.18	30.77	61.50
Transverse					
Number	1	0	9	3	1
Percent	0.46	0.00	2.59	1.10	0.80
Totals	219	98	347	273	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Parallel	2	1	1	0
Slightly oblique	6	9	5	3
Medium oblique	7	8	5	3
Transverse	1	3	1	0

Some obliquity of the nostril axes is characteristic of nearly all the Papago, since their axis direction is about equally divided between medium and submedium degrees of obliquity. Among Seltzer's series, the Yaqui and Zuñi show considerably higher frequencies of more oblique nostrils than the Papago, and the Hopi have a higher incidence of slightly oblique.

LIPS: INTEGUMENTAL THICKNESS

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Thin					
Number	0	3	8	11	3
Percent	0.46	3.00	2.31	3.99	2.40

Medium					
Number	113	33	275	250	111
Percent	51.60	33.00	79.25	90.58	88.80
Thick					
Number	105	64	64	15	11
Percent	47.94	64.00	18.44	5.43	8.80
Totals	219	100	347	276	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Thin	2	2	4	2
Medium	4	10	15	12
Thick	4	11	17	13

The recorded observations of the integumental parts of the Papago lips are divided between thick and medium. The Yaqui have a greater frequency of thick lips, while the Pueblos and Navaho show significantly lower incidence of thick lips.

LIPS: MEMBRANOUS THICKNESS

	Papago	Yaqui	Zuñi	Hopi	Navaho
Thin					
Number	5	2	4	6	2
Percent	2.28	2.00	1.15	2.17	1.60
Medium					
Number	116	31	226	198	83
Percent	52.97	31.00	65.13	71.74	66.40
Thick					
Number	98	50	116	71	36
Percent	44.75	50.00	33.43	25.73	28.80
Very thick					
Number	0	17	1	1	4
Percent	0.00	17.00	0.29	0.36	3.20
Totals	219	100	347	276	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Thin	0	1	0	0
Medium	5	4	6	3
Thick	1	4	6	4
Very thick	6	1	1	3

Thickness of the membranous lips is not infrequently marked among the Papago; rarely are the lips thin. According to Seltzer's material, a much greater development of thick lips occurs among the Yaqui. The northern groups, in contrast, are significantly thinner-lipped.

LIP EVERSION

	Papago	Yaqui	Zuñi	Hopi	Navaho
Submedium					
Number	24	13	127	38	21
Percent	10.96	13.00	36.60	31.65	16.80

Medium					
Number	157	46	193	172	89
Percent	71.69	46.00	55.62	61.87	71.20
Pronounced					
Number	38	22	26	17	14
Percent	17.35	22.00	7.49	6.12	11.20
Very pronounced					
Number	0	19	1	1	1
Percent	0.00	19.00	0.29	0.36	0.80
Totals	219	100	347	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Submedium	0	11	13	2
Medium	6	5	3	0
Pronounced	1	5	5	2
Very pronounced	7	1	1	1

Lip eversion is moderate among most Papago, although some 17 percent show pronounced eversion. Comparison with the Yaqui is conspicuous for the greater incidence of pronounced and very pronounced eversion. Both of the Pueblo tribes and the Navaho have less everted lips than the Papago.

LIP SEAM

	Papago	Yaqui	Zuñi	Hopi	Navaho
Absent					
Number	89	52	336	228	110
Percent	40.64	52.00	96.83	82.01	88.00
Small					
Number	67	18	9	23	9
Percent	30.59	18.00	2.59	8.27	7.20
Medium					
Number	58	21	2	26	5
Percent	26.48	21.00	0.58	9.35	4.00
Pronounced					
Number	5	9	0	1	1
Percent	2.28	9.00	0.00	0.36	0.80
Totals	219	100	347	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent	2	23	15	15
Small	3	12	9	8
Medium	1	12	7	9
Pronounced	3	3	2	1

About 60 percent of the Papago have a lip seam in one degree or another; for the most part it is small or medium. Among the neighboring tribes, the Yaqui approach the Papago in the incidence of a visible seam. All of the northern groups show a marked lower frequency of the trait.

MID-FACIAL PROGNATHISM

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
Number	197	92	342	273	125
Percent	89.95	92.92	99.13	99.27	100.00
Slight					
Number	20	7	2	2	0
Percent	9.13	7.07	0.58	0.73	0.00
Medium					
Number	1	0	1	0	0
Percent	0.46	0.00	0.29	0.00	0.00
Pronounced					
Number	1	0	0	0	0
Percent	0.46	0.00	0.00	0.00	0.00
Totals	219	99	345	275	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent	1	6	6	7
Slight	0	6	5	6
Medium	1	0	1	1
Pronounced	1	1	1	1

Lack of facial prognathism is characteristic of about 90 percent of the Papago, although they and the Yaqui exhibit a small degree of it considerably more often than do the Pueblo and Navaho people, among whom its occurrence is negligible.

ALVEOLAR PROGNATHISM

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
Number	146	58	315	268	112
Percent	66.67	58.00	90.52	96.40	89.60
Slight					
Number	52	28	28	8	11
Percent	23.74	28.00	8.05	2.88	8.80
Medium					
Number	16	10	5	2	2
Percent	7.31	10.00	1.44	0.72	1.60
Pronounced					
Number	5	3	0	0	0
Percent	2.28	3.00	0.00	0.00	0.00
Very pronounced					
Number	0	1	0	0	0
Percent	0.00	1.00	0.00	0.00	0.00
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent	2	10	13	8
Slight	1	7	10	5
Medium	1	4	5	4
Pronounced	0	3	3	3
Very pronounced	1	-	-	-

Alveolar prognathism is a good deal more common among the Papago than is mid-facial. About a third of the series exhibit the trait in some form. The Yaqui incidence somewhat exceeds that of the Papago. A significant decline in this form of protrusion occurs among the Pueblo and Navaho tribes, among whom a lack of the condition is usual.

CHIN PROMINENCE

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Submedium					
Number	139	51	266	57	54
Percent	63.47	51.00	76.66	20.50	43.20
Medium					
Number	80	47	76	213	71
Percent	36.53	47.00	21.00	76.62	56.80
Pronounced					
Number	0	2	5	8	0
Percent	0.00	2.00	1.44	2.88	0.00
Totals	219	100	347	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Submedium	3	4	15	5
Medium	2	5	14	5
Pronounced	2	3	4	—

Submedium chin prominence is the commonest form among the Papago; pronounced prominence does not occur in the series. This distribution is most closely approached by the Yaqui. The Zuñi chin is more often slight than is the Papago, while the Hopi show a conspicuously lower frequency of small chin prominence.

CHIN TYPE

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Median					
Number	191	87	332	277	125
Percent	87.21	95.60	95.40	99.64	100.00
Bilateral					
Number	28	4	16	1	0
Percent	12.79	4.40	4.60	0.36	0.00
Totals	219	91	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Median	3	4	8	8
Bilateral	3	4	8	8

The 13 percent incidence among the Papago of a bilateral

chin is unusual in the Southwest, according to the comparative data of Seltzer.

TEETH: ERUPTION

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Complete					
Number	204	no data	281	253	107
Percent	93.15		81.21	92.00	85.60
Partial					
Number	15		65	22	18
Percent	6.85		18.79	8.00	14.40
Totals	219		346	275	125

Difference of Means in Terms of P. E.

	PZ	PH	PN
Complete	6	0	3
Partial	6	0	3

As far as the Papago series is concerned, the 6.85 percent occurrence of partial eruption is almost completely due to the inclusion of younger adults who showed a normal absence of the third molar. The writer's notes indicate that in only two cases was the wisdom tooth abnormally suppressed.

TEETH: BITE

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Under					
Number	1	no data	2	0	0
Percent	0.46		0.58	0.00	0.00
Edge-edge					
Number	13		5	1	0
Percent	5.94		1.44	0.36	0.00
Submedium over					
Number	193		340	277	123
Percent	88.13		97.98	99.64	98.40
Pronounced over					
Number	12		0	0	0
Percent	5.48		0.00	0.00	0.00
Totals	219		347	278	125

Difference of Means in Terms of P. E.

	PZ	PH	PN
Under	0	1	1
Edge-edge	3	5	5
Submedium over	6	7	6
Pronounced over	5	5	3

A slight overbite is usual among the Papago; only a few have pronounced overbites or edge to edge, and an underbite is recorded only once. The Pueblo and Navaho groups, according to Seltzer, exhibit the submedium overbite almost universally.

TEETH: LOSS

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
None					
Number	86	no data	175	153	89
Percent	39.27		50.43	55.04	71.20
Few (1-4)					
Number	78		110	55	22
Percent	35.62		31.70	19.78	17.60
Submedium (5-8)					
Number	40		35	32	8
Percent	18.27		10.09	11.51	6.40
Medium (9-16)					
Number	12		18	18	4
Percent	5.48		5.19	6.47	3.20
Pronounced (17-X)					
Number	3		9	20	2
Percent	1.37		2.69	7.19	1.60
Totals	219		347	278	125

Difference of Means in Terms of P. E.

	PZ	PH	PN
None	3	5	9
Few	1	5	5
Submedium	3	3	5
Medium	0	7	3
Pronounced	4	7	3

Tooth loss among adult male Papago is not excessively high considering their mode of life. Absence of age factors for the groups recorded by Seltzer does not permit of detailed comparisons.

TEETH: WEAR

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
and submedium					
Number	58	no data	179	103	53
Percent	26.48		57.58	37.18	42.40
Medium					
Number	88		55	33	23
Percent	40.18		15.85	11.91	18.40
Pronounced					
and very pronounced					
Number	73		113	141	49
Percent	33.33		32.86	50.90	39.20
Totals	219		347	277	125

Difference of Means in Terms of P. E.

	PZ	PH	PN
Absent and submedium	11	3	4
Medium	9	10	6
Pronounced and very pronounced	0	6	1

Lack of age factors again limit the effectiveness of utilization of the above descriptions of tooth wear. Variations in eating habits could also influence these comparisons.

TEETH: CARIES					
	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
Number	30	no data	252	211	108
Percent	13.76		72.62	75.90	86.49
Few (1-4)					
Number	131		83	53	12
Percent	60.09		23.92	19.06	9.60
Medium (5-8)					
Number	49		9	12	4
Percent	22.48		2.59	4.32	3.20
Many (9-16)					
Number	6		3	2	1
Percent	2.75		0.86	0.72	0.80
Very many (17-X)					
Number	2		0	0	0
Percent	0.92		0.00	0.00	0.00
Totals	218		347	278	125

Difference of Means in Terms of P. E.

	PZ	PH	PN
Absent	26	26	28
Medium	10	8	8
Few	10	8	8
Many	2	2	2
Very many	2	2	2

General soundness of the teeth is apparent among all the tribes recorded above. Apparently the Papago teeth are the least free from caries; the contrast between them and the Pueblo-Navaho groups is striking even with lack of age data. A good deal of the differences expressed must be due to hereditary trends or environmental factors, or both.

That some of the indicated differences are owing to environment is not unlikely. The Papago has departed a long ways from the habits of his ancestors and he utilizes the commercially prepared foods of the white man as much as possible. The relative excellence of Navaho teeth may be associated with greater protein content in their diet.

TEETH: CROWDING					
	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
Number	50	no data	244	255	95
Percent	22.94		70.32	91.73	76.00

Medium				
Number	158	84	21	19
Percent	72.48	24.21	7.55	5.20
Pronounced				
Number	10	19	2	11
Percent	4.59	5.48	0.72	8.80
Totals	218	347	278	125

Difference of Means in Terms of P. E.

	PZ	PH	PN
Absent	18	31	16
Medium	18	28	19
Pronounced	0	2	1

The Papago show a moderate amount of tooth crowding in the majority of cases, but seldom is it excessive. Considerably less crowding occurs among the northern tribes, least of all among the Hopi.

MALARS: FRONTAL PROJECTION

	Papago	Yaqui	Zuñi	Hopi	Navaho
Absent and submedium					
Number	8	64	264	185	78
Percent	3.67	64.00	75.86	66.53	62.40
Medium					
Number	103	29	71	80	27
Percent	47.25	29.00	20.40	28.78	21.00
Pronounced					
Number	107	7	13	13	20
Percent	49.08	7.00	3.74	4.68	16.00
Totals	218	100	348	276	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent and submedium	18	40	29	19
Medium	4	9	6	7
Pronounced	14	19	18	10

Frontal projection of the malars among the Papago is rather evenly divided between moderate and pronounced. This incidence is quite in contrast to the groups recorded by Seltzer, who show little or no projection in the majority of cases. The writer believes that these comparisons are disturbed by personal differences of observation.

MALARS: LATERAL PROJECTION

	Papago	Yaqui	Zuñi	Hopi	Navaho
Absent					
Number	0	1	5	1	1
Percent	0.00	1.00	1.44	0.36	0.80

Submedium					
Number	38	38	96	61	12
Percent	17.43	38.00	27.59	21.94	9.60
Medium					
Number	39	29	143	158	46
Percent	17.89	29.00	41.09	56.83	36.80
Pronounced					
Number	140	26	91	57	52
Percent	64.22	26.00	26.15	20.50	41.60
Very pronounced					
Number	1	6	13	1	14
Percent	0.46	6.00	3.74	0.36	11.20
Totals	218	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent	1	3	1	1
Submedium	5	4	1	3
Medium	3	5	14	5
Pronounced	10	14	16	6
Very pronounced	3	4	0	5

The majority of Papago have a pronounced lateral jut of the cheek bones and all of them show malar projection to some extent. Seltzer's data describes the other Southwestern tribes as having considerably less lateral malar projection. Personal differences between the observers seem again to intrude.

GONIAL ANGLES

	Papago	Yaqui	Zuni	Hopi	Navaho
Submedium					
Number	85	22	57	43	15
Percent	39.17	22.22	16.43	15.47	12.00
Medium					
Number	117	60	200	161	75
Percent	53.92	60.60	57.64	57.91	60.00
Pronounced					
Number	15	16	79	67	32
Percent	6.91	16.16	22.77	24.10	25.60
Very pronounced					
Number	0	1	11	7	3
Percent	0.00	1.01	3.17	2.52	2.40
Totals	217	99	237	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Submedium	4	8	8	9
Medium	1	1	1	1
Pronounced	3	8	8	6
Very pronounced	1	5	3	2

Although more than 50 percent of the Papago have mod-

erately developed gonial angles, a strong minority show sub-medium conditions. This contrasts somewhat with the groups described by Seltzer, particularly the Pueblo and Navaho people who have significantly higher frequencies of pronounced gonial angles.

EAR: HELIX ROLL

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Very small					
Number	0	7	7	15	8
Percent	0.00	7.00	2.01	5.40	6.40
Small					
Number	61	25	120	41	20
Percent	27.85	25.00	34.48	14.75	16.00
Medium					
Number	130	67	189	189	84
Percent	59.36	67.00	54.31	67.99	67.20
Large					
Number	28	1	32	33	13
Percent	12.79	1.00	9.20	11.87	10.40
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Very small	4	3	5	4
Small	0	2	5	3
Medium	1	1	2	2
Large	7	1	0	1

The degree of ear helix roll is moderate in the majority of Papago, though a small amount of roll is the secondary tendency. Other Southwestern groups show similar ranges from medium to small.

EAR: ANTIHELIX

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
Number	1	1	9	14	6
Percent	0.46	1.00	2.59	5.04	4.80
Small					
Number	34	36	136	116	45
Percent	15.52	36.00	39.08	41.73	36.00
Medium					
Number	177	61	175	127	68
Percent	80.82	61.00	50.29	45.68	54.40
Pronounced					
Number	7	2	28	21	6
Percent	3.20	2.00	8.05	7.55	4.80
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent	0	3	4	3
Small	5	9	10	6
Medium	5	11	13	7
Pronounced	0	3	3	1

A moderate development of the antihelix is common to the Papago. Significantly higher incidences of a small antihelix is apparent in the other tribes.

DARWIN'S POINT

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
Number	195	91	258	199	98
Percent	89.04	91.00	74.14	71.58	78.40
Small					
Number	23	5	65	71	21
Percent	10.50	5.00	18.68	23.54	16.80
Medium					
Number	1	3	23	8	6
Percent	0.46	3.00	6.61	2.88	4.80
Large					
Number	0	1	2	0	0
Percent	0.00	1.00	0.57	0.00	0.00
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent	0	6	7	3
Small	2	4	6	2
Medium	2	6	3	3
Large	1	2	—	—

The Papago have a fairly low frequency of the Darwin's point of the ear—a little more than 10 percent. The trait is more manifest among the Pueblo and Navaho people.

EAR LOBE: ATTACHMENT

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Soldered					
Number	11	7	25	22	8
Percent	5.02	7.00	7.18	7.91	6.40
Attached					
Number	153	36	128	102	64
Percent	69.86	36.00	36.78	36.69	51.20
Free					
Number	55	57	195	154	53
Percent	25.12	57.00	56.03	55.40	42.40
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Soldered	1	1	1	0
Attached	8	12	11	5
Free	8	11	10	4

The ear lobe of the Papago is more often than not attached to the side of the face. In this regard they contrast with the neighboring tribes all of whom show lesser incidence of the attached and considerably high percentage of free lobes.

EAR LOBE: SIZE

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
Number	0	0	0	1	0
Percent	0.00	0.00	0.00	0.36	0.00
Small					
Number	7	14	40	34	18
Percent	3.20	14.00	11.49	12.23	14.40
Medium					
Number	114	60	236	198	97
Percent	52.05	60.00	67.82	71.22	77.60
Large					
Number	98	26	72	45	10
Percent	44.75	26.00	20.69	16.19	8.00
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent	—	—	1	—
Small	4	5	5	4
Medium	1	5	6	7
Large	5	8	10	13

A good many Papago have large ear lobes, the bulk of them falling in the medium and large categories. Large lobes are significantly more frequent among Papago than among the other Southwestern tribes.

EAR: PROTRUSION

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Slight					
Number	3	22	212	29	19
Percent	1.37	22.00	61.27	10.43	15.20
Medium					
Number	171	68	122	240	93
Percent	78.08	68.00	35.26	86.33	74.40
Pronounced					
Number	45	10	12	9	13
Percent	20.55	10.00	3.47	3.24	10.40
Totals	219	100	346	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Slight	7	32	6	6
Medium	1	16	3	1
Pronounced	3	8	8	3

Ears of moderate protrusion are the commonest type among the Papago, although over 20 percent have protrusive ears. The other Southwestern tribes tend more often toward slight protrusion of ears; the Zuñi particularly are distinctively different from the Papago.

EAR: SLANT

	Papago	Yaqui	Zuñi	Hopi	Navaho
Medium					
Number	215	97	332	259	123
Percent	98.17	97.00	95.95	93.17	98.40
Pronounced					
Number	4	3	14	19	2
Percent	1.83	3.00	4.05	6.83	1.60
Totals	219	100	346	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Medium	0	2	2	0
Pronounced	0	2	2	0

Nearly all the Papago show moderate slope of the ears, a condition shared by the other tribes.

OCCIPITAL FLATTENING

	Papago	Yaqui	Zuñi	Hopi	Navaho
Absent					
Number	25	62	22	no data	no data
Percent	11.42	62.00	6.34		
Medium					
Number	142	35	216		
Percent	64.84	35.00	62.25		
Pronounced					
Number	52	3	86		
Percent	23.74	3.00	24.78		

Difference of Means in Terms of P. E.

	PY	PZ
Absent	14	2
Medium	7	0
Pronounce	9	0

Occipital flattening is very common among the Papago. It is equally present among the Zuñi but more often lacking in the Yaqui.

OCCIPITAL PROTRUSION

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Absent					
Number	29	37	60	20	18
Percent	13.24	37.00	17.44	7.55	14.40
Slight					
Number	146	60	268	219	99
Percent	66.67	60.00	77.91	82.64	72.20
Medium					
Number	44	3	15	26	8
Percent	20.09	3.00	4.36	9.81	6.40
Pronounced					
Number	0	0	1	0	0
Percent	0.00	0.00	0.29	0.00	0.00
Totals	219	100	344	265	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Absent	6	2	3	0
Slight	1	4	6	3
Medium	7	7	4	5
Pronounced	—	1	—	—

Some protrusion of the occiput is characteristic of most Papago. According to Seltzer's data, the Yaqui are considerably less protrusive in this region, while slight protrusion dominates the other tribes.

BODY BUILD

	<i>Papago</i>	<i>Yaqui</i>	<i>Zuñi</i>	<i>Hopi</i>	<i>Navaho</i>
Linear					
Number	8	57	254	184	98
Percent	3.65	57.00	72.99	66.19	78.40
Medium					
Number	133	35	69	77	23
Percent	60.73	35.00	19.83	27.70	18.40
Lateral					
Number	78	8	25	17	4
Percent	35.62	8.00	7.18	6.12	3.20
Totals	219	100	348	278	125

Difference of Means in Terms of P. E.

	PY	PZ	PH	PN
Linear	15	38	29	28
Medium	6	15	11	13
Lateral	9	11	12	13

Medium and lateral body builds are the rule among the Papago with the majority in the middle class. The writer believes that the differences shown by Seltzer's data are dubious; that they are largely influenced by personal differences in the opinions of the observers.

CONCLUSIONS

SUMMARY OF METRICAL DATA

GENERAL DIFFERENCES

The table on pages 81-83 bring together averages of physical traits of the Papago and of the three tribes to which the Papago can be compared in this respect: the Yaqui, Zuñi, and Hopi. The Papago averages are paired with those of the other three groups, the means being arranged in the order of their statistical significance.¹ This tabulation permits a detailed comparison of all the physical differences as well as the importance of the differences. In other words, there is shown the nature of the differences, the degree of the differences, and the significance of the differences in one glance.

A major concern in an intertribal comparison is to demonstrate whether or not the aggregate of differences exhibited by the tribes has real anthropometric meaning. In other words

. . . whether the differences between the constants arise merely from the fluctuations incident to the sampling process, or whether, on the basis of probability, these differences are actually due to some factor or factors other than chance and inherent in the series themselves.²

A standard method of such appraisal—that of comparing the corrected differences between arithmetic means of differences in means in terms of probable error—has been employed in the body of this discussion and in the table immediately following.

¹ " . . . An error or deviation that is equal to, or a little more than, the probable error is as likely as not to be merely the result of sampling or the random selection of a small group of observations. A deviation which exceeds twice the probable error in either direction is likely to occur as the result of sampling alone about 18 times in 100 trials, or the odds are about 4.6 to 1 against its occurrence at any one trial. A deviation exceeding 3 times the probable error may be expected to occur only about 4 times in 100 trials and one exceeding 4 times the probable error only 7 times in 1000 trials. The odds against the occurrence of deviations equal to 3 times the probable error, as a result of simple sampling, are about 22 to 1, and the case of 4 times the probable error, 141 to 1" (Hooton, *The American Criminal*).

² Hooton, *The American Criminal*.

COMPARED TRAITS IN ORDER OF SIGNIFICANCE

PAPAGO-YAQUI

X P. E. Character		Means	
6 - x		Papago	Yaqui
	Weight	157.30	140.70
	Sitting height	87.34	83.10
	Relative sitting height	51.82	49.72
	Biacromial breadth	38.69	37.32
	Shoulder-hip index	75.93	78.98
	Chest breadth	30.18	27.87
	Thoracic index	73.02	76.78
	Minimum frontal diameter	106.70	100.78
	Fronto-parietal index	70.54	67.70
	Zygo-frontal index	74.58	72.06
	Total face height	133.50	127.40
	Total facial index	93.55	90.20
	Upper face height	79.30	73.20
	Upper facial index	55.26	52.10
	Fronto-gonial index	99.90	108.90
	Zygo-gonial index	74.65	77.60
	Nose height	61.06	55.02
	Nose breadth	40.46	42.29
	Nasal index	65.90	77.38
5 - 6	Chest depth	22.16	21.38
	Head circumference	552.65	546.20
	Head length	186.66	183.84
4 - 5	Stature	168.81	166.68
	Span	174.63	172.20
	Relative shoulder breadth	23.02	22.64
	Bigonial breadth	106.86	109.10
3 - 4	Head height	130.26	128.05
2 - 3	Head breadth	130.25	149.23
	Cephalic index	80.52	81.28
	Bizygomatic breadth	142.25	141.00
	Relative span	103.52	102.94
1 - 2	Cranial breadth-height (%)	86.45	85.54
0 - 1	Bi-iliac breadth	29.56	29.64
	Cranial length-height (%)	69.77	69.91
	Cephalo-facial index	94.25	94.18

PAPAGO-ZUÑI

X P. E. Character		Means	
6 - x		Papago	Zuñi
	Weight	157.30	123.90
	Stature	168.81	161.43
	Span	174.63	167.04
	Sitting height	87.34	84.66
	Relative sitting height	51.82	52.42
	Biacromial breadth	38.69	37.43
	Bi-iliac	29.56	28.30

COMPARED TRAITS IN ORDER OF SIGNIFICANCE (cont'd.)

	Chest breadth	30.18	27.66
	Chest depth	22.16	19.82
	Head circumference	552.65	547.10
	Head length	186.66	179.88
	Head breadth	150.25	152.80
	Cranial index	80.52	85.09
	Head height	130.26	127.80
	Cranial breadth-height (%)	86.45	83.74
	Minimum frontal diameter	106.70	103.62
	Fronto-parietal index	70.54	67.88
	Zygo-frontal index	74.58	72.22
	Total face height	133.50	126.00
	Total facial index	93.55	87.80
	Upper face height	79.30	73.50
	Upper facial index	52.26	51.20
	Fronto-gonial index	99.90	103.50
	Nose height	61.06	55.82
	Nose breadth	40.46	37.67
5 - 6	Cranial length-height (%)	69.77	70.90
	Nasal index	65.90	67.74
4 - 5	Thoracic index	73.02	71.78
	Bizygomatic breadth	142.25	143.60
3 - 4	none		
2 - 3	Relative shoulder breadth	23.02	23.16
1 - 2	Shoulder-hip index	75.93	75.58
	Cephalo-facial index	94.25	94.06
0 - 1	Relative span	103.52	103.54
	Bigonial breadth	106.86	107.14
	Zygo-gonial index	74.65	74.51

PAPAGO-HOPI

X P.E. Character

Means

6 - x

	Papago	Hopi
Weight	157.30	133.70
Stature	168.81	161.10
Span	174.63	165.06
Relative span	103.52	102.44
Sitting height	87.34	83.94
Biacromial breadth	38.69	37.43
Shoulder-hip index	75.93	79.98
Chest breadth	30.18	28.35
Chest depth	22.16	21.18
Thoracic index	73.02	74.90
Head length	186.66	183.00
Head breadth	150.25	153.55
Cranial index	80.52	84.01
Head height	130.26	126.85
Breadth-height index	86.45	82.78
Minimum frontal	106.70	104.14
Fronto-parietal index	70.54	67.76

COMPARED TRAITS IN ORDER OF SIGNIFICANCE (cont'd.)

	Bizygomatic breadth	142.25	144.95
	Zygo-frontal index	74.58	71.86
	Total face height	135.50	122.45
	Total facial index	93.55	84.75
	Upper face height	79.30	68.35
	Upper facial index	55.26	47.27
	Bigonial breadth	106.86	109.34
	Fronto-gonial index	99.90	104.85
	Nose height	61.06	50.50
	Nasal index	65.90	79.58
5 - 6	none		
4 - 5	none		
3 - 4	Relative shoulder breadth	23.02	23.26
	Bi-iliac breadth	29.56	29.98
	Zygo-gonial index	74.65	75.32
	Nose breadth	40.46	39.86
2 - 3	Relative sitting height	51.82	52.10
	Cranial length-height (%)	69.77	69.25
1 - 2	Head circumference	552.65	554.45
0 - 1	Cephalo-facial index	94.25	94.36

Since no single physical trait is variable enough to establish anthropometric individuality between groups, it is necessary to muster the combined evidence of all or several of the comparisons in order to demonstrate the presence or lack of real physical difference among the tribes. This has been done in the following table. The sums of the differences in means shown in thirty-five traits are rated in terms of the probable errors and are arranged according to tribal comparisons.

Since an anthropometric frequency curve approximates a normal curve, it is permissible to make use of the table of deviates of the ideal curve in order to see what deviations in terms of their probable errors may be expected in random samples of the same size.

Deviates of the Ideal Curve

	<i>X-1</i>	<i>1-2</i>	<i>2-3</i>	<i>3-4</i>	<i>4-5</i>	<i>5-6</i>	<i>6-7</i>
Percent	50.00	32.27	14.43	3.60	0.62	0.07	0.002

In the table below, the value thirty-five (which is the number of physical criteria used) is split up into the normally expected values of differences of means in terms of probable

errors. By comparing the actual and the expected deviations, one can determine whether or not the differences are significant or whether they are due to chances of sampling.

Distribution of \times P. E. of Thirty-Five Traits

	0-1	1-2	2-3	3-4	4-5	5-6	6-X	Mean \times P.E.
Normal	17.50	11.29	5.05	1.26	0.21	0.02	0.00	1.01
Papago- Yaqui	3	1	4	1	4	3	19	8.18
Papago- Zuñi	3	2	1	0	2	2	25	12.30
Papago- Hopi	1	1	2	4	0	0	27	13.70

The above table demonstrates: (1) that few of the relationships between the tribes approach the normal pattern, and (2) that the great majority of the differences between the means are considerably more than three times the square root of the sum of the squares of the probable errors of the means. For these reasons it is clear that the Papago show real and significant physical differences from the Yaqui, Zuñi, and Hopi.

DIFFERENCES OF THE BODY

If comparisons are confined to gross body traits, we can arrive at a fair approximation of tribal differences in general body build. The following table displays such differences in terms of centimeters and of probable errors.

Averages of Seven Body Measurements

	In cms.	Mean of \times P. E.
Papago-Yaqui	1.83	7.65
Papago-Zuñi	3.57	18.61
Papago-Hopi	3.60	15.30

There is no question here but that there are conspicuous differences in absolute body size. The Papago stand well apart from the other tribes by virtue of their greater body size. The greatest contrast in body bulk is between the Papago and Zuñi. The Hopi are also impressively smaller. The position of the Yaqui is intermediate between the Papago and the two Pueblo groups.

Averages of Five Body Ratios

	<i>In percent</i>	<i>Mean of \times P. E.</i>
Papago-Yaqui	1.99	8.61
Papago-Zuñi	.47	3.02
Papago-Hopi	1.51	6.63

Comparison of the ratios derived from body measurements reveals several different trends. The Papago and Zuñi, who in absolute body size are the largest and smallest people of this series, are here shown as the least dissimilar. The Papago and Hopi, also widely divergent in absolute body values, show the next closest affinity in body indices. Both of these pairs of tribes, however, are statistically distinct in body proportions. The Yaqui are farthest removed from the Papago; their divergence from the Papago is owing particularly to relatively longer legs, narrower shoulders, and deep chests.

These comparisons of body size exclude the factor of weight. If this trait is reexamined a more complete impression of the position of the Papago is possible. The Papago take the lead in general body mass. They are heavier and taller than the other groups and they excel in all other body diameters save hip breadth. In contrast, the Zuñi are the smallest people: the least in stature, weight, and lateral diameters. The Papago-Hopi contrast largely boils down to inferiority of the Hopi in stature, span, relative span, and shoulder breadth, coupled with large and relatively deep chests as well as wide hips. The distinctiveness of the Yaqui lies largely in their relatively short trunks, long legs, deep chests, and narrow shoulders.

DIFFERENCES OF THE HEAD AND FACE

Averages of Eleven Head and Face Measurements

	<i>In mms.</i>	<i>Mean of \times P. E.</i>
Papago-Yaqui	3.79	8.29
Papago-Zuñi	3.96	12.61
Papago-Hopi	4.67	15.50

All of the means of the head and face diameters show significant differences and in most cases these differences are pronounced. The Papago-Hopi contrast is most striking and is due to the following differences in head and face architecture. The Papago values excel in length and height diameters,

especially of the nose and face, and to a lesser extent in head height and head length. On the other hand, the Papago have narrower jaws, faces, and heads than the Hopi. Signal differences also mark the Papago-Zuñi comparison and they tend to follow the same pattern, though somewhat attenuated. The combination which sets the Papago apart from the Yaqui is greater head circumference, broader heads, wider foreheads and faces, plus narrower noses.

Averages of Eleven Head and Face Ratios

	<i>In index points</i>	<i>Mean of \times P. E.</i>
Papago-Yaqui	2.90	7.79
Papago-Zuñi	2.67	10.94
Papago-Hopi	3.38	14.63

As in body proportions the Papago stand out from the others in regards indices of the head and face. The Papago are especially different from the Hopi and Zuñi and this divergence is due mostly to their decided leptoprosopy and leptorrhiny. Papago superiority in fronto-parietal and zygo-frontal ratios also sets them apart. The Papago are a good deal less broad-headed than are the Pueblo tribes, and, finally, their jaws, which are narrow relative to forehead breadth, are distinctive. Greater nose and face length also set the Papago apart from the Yaqui. Furthermore, the Yaqui have narrower foreheads relative to head breadth and wider jaws relative to both forehead and total facial width.

SUMMARY OF MORPHOLOGICAL TRAITS

MORPHOLOGICAL TRAITS COMMON TO MOST PAPAGO

Skin. The unexposed parts of the body are light brown or less often red brown. These shades are deepened by sun and wind on the face to dark brown and sometimes chocolate. Freckling of the skin is rare but there is an uncommonly high frequency of moles.

Hair. Most Papago have straight, black, coarse hair which is moderately thick on the head. Baldness is very uncommon even among the older men. Face hair is lacking or sparse and body hair is usually absent, at least from the chest.

Forehead. Though not receding, the forehead is more often somewhat sloping than straight; in height it is not distinctive. Brow ridges are not pronounced and the temporal areas are often rather flat.

Face. Prognathism of the mid-facial region is not typical. Only about 10 percent show it and these mostly to a slight degree. Alveolar prognathism is more common but not often pronounced.

Projection of the cheek bones approaches the popular concept of American Indians. Anterior and lateral malar development are commonly pronounced, particularly the latter. In contrast, the gonion of the jaws range between medium and small.

Eyes. Dark shades of brown dominate the eye color. Nearly half of the Papago have external eye folds, though the condition is not usually pronounced. Lesser developments of median eye folds are not uncommon. The internal epicanthic fold is relatively scarce among the adult males, though common in children. The eye usually tilts somewhat at the outer edge and the opening of the eyes is not as wide as among most Europeans.

Nose. As far as general size is concerned, the nose is generously endowed. Nasion depression is moderate to small. Root heights are medium to high, and the roots are commonly broad. The bridge of the nose, too, is not infrequently high and broad. In profile the nose is convex or straight, more often the former. The nasal tip may be thick or medium and is usually inclined slightly upward. Very often the nasal wings are flaring. Some degree of nostril visibility is usual from the front and side. The nostrils are medium to round in shape and their axes are oblique.

Lips. Well developed lips characterize most Papago. The integumental portions are medium to heavy and the membranous parts also incline to thickness. Lip eversion is average and a lip seam is not often marked.

Chin. In contrast to the upper face, the chin is more conspicuous for its lack of development; submedium and medium prominence is the rule.

Teeth. Over all judgment of Papago teeth is that they are better than most Caucasian's but not as good as those of other Southwestern Indians. Caries are common; crowding is often moderate; wear is not excessive for Indians; and tooth loss is not unusually high.

Ears. Large ears are common and large lobes characterize nearly half of the series. The lobe is attached more often than free.

Occiput. The back of the head is commonly somewhat flattened.

Body Build. Medium types of body build are the most frequent; lateral types are much more common than linear.

MORPHOLOGICAL DIFFERENCES BETWEEN TRIBES

In this summary, some of the material presented earlier has been disregarded for reason of accuracy. There are two unwanted factors which distort the real significance of some of the observations. These are differences of observational opinion between the investigators and age influences.

The differences in judgment that are apparent to the writer have been remarked earlier, and where it is felt that they have strongly influenced the data, the data have been excluded. Data of this nature include eye color, brow ridge size, hair texture, nasal root breadth, nasal bridge height, nostril shape, nostril axes, membranous lip thickness, lip eversion, frontal and lateral malar projection, and body build.

Likewise, physical traits so obviously and strongly affected by age as to becloud racial issues have been deleted from the summary. These are mainly concerned with baldness, beard quantity, body hair quantity, hair grayness, tooth eruption, tooth loss, and tooth wear.

It is recognized that all the differences of personal judgment and all age influences have not been eliminated by this procedure, but it is felt that the most distracting elements have been eliminated and that what remain of them do not seriously obscure the real variations that exist between the tribes.

STATISTICAL SIGNIFICANCE OF MORPHOLOGICAL DIFFERENCES

The table which follows marshals all the valid morphological evidence in order to indicate the significance of the differences that exists between the Papago and neighboring tribes. The number of traits retained for this demonstration is one hundred fifty-five. This value has been divided into the normally expected percentages of deviations of means in terms of probable errors and the normal dispersion is compared with the actual deviations.

Differences of Means in Terms of Probable Errors of
55 Morphological Traits

Normal	0-1 77.50	1-2 50.02	2-3 22.37	3-4 5.58	4-5 0.96	5-6 0.11	6-X 0.00
Papago-Yaqui	40	39	23	16	11	3	23
Papago-Zuñi	18	20	26	20	18	8	45
Papago-Hopi	18	23	18	18	13	13	52
Papago-Navaho	34	21	20	20	12	12	36

It is apparent that the Papago are strongly divergent from the other tribes. The greatest number of significant differences occur between the Papago and Hopi, and the next largest diversity exists between the Papago and Zuñi. The Papago-Yaqui comparison exhibits much fewer differences.

GENERAL SUMMARY

THE PAPAGO

The Papago show a number of significant physical differences from the Yaqui, Zuñi, Hopi and Navaho. These differences are so numerous and extensive that they cannot be attributed solely to chances of sampling, and must be recognized as having real racial meaning.

Papago distinctiveness is largely a matter of greater size as far as gross body features are concerned. They are the tallest (excepting the Navaho) and heaviest of the tribes considered in the detailed comparisons. They exceed in shoulder breadth and chest diameters. As for cranial features, the Papago have longer faces and especially longer noses, both absolutely and relatively. They are also significantly longer headed.

Numerous qualitative characters set the Papago apart. Their skin color is darker, although they share this condition with the Yaqui. They have a higher incidence of low, wavy hair and more beard; external eye folds are more frequently developed and foreheads more sloping. The nose shares a high bridge and convex profile with the other tribes, but it is commonly broader across the bridge and more thickened at the tip. A greater flare of the nasal wings is apparent. Thick lips set them apart from the northern tribes, but not from the Yaqui. These characters, combined with some alveolar prognathism and a tendency to smaller chins, results in the typical Papago face. There are also some variations of the external ear that mark the Papago: the ears are larger and more protrusive and the lobes are more often attached.

PAPAGO-YAQUI

The individuality of the Yaqui compared with the Papago is less a matter of size and more of proportions. Their main distinction in linear diameters is low sitting height. In body ratios, they stand out for their relatively long legs, narrow shoulders, and deep chests. Important cranial variations include narrower foreheads and faces coupled with broader noses and relatively wide jaws. Also, the Yaqui are the only people who commonly possess a protrusive occiput.

The skin and eye color of the Yaqui is darker than any other group and they are least often beardless. More common, too, is an upward tilt of the eyes. A combination of pronounced brow ridges and sloping forehead mark the frontal area. The nose is high, broad, and convex, but the wings flare even more than among the Papago. Lip thickness and eversion are especially marked.

PAPAGO-ZUÑI

Compared with the Papago, the Zuñi have particularly small and slight bodies. Their deficiencies in chest and hip diameters also stand out. Body proportions indicate that they have relatively longer trunks and shallower chests. The Zuñi are much more broad headed than the Papago, although deformation accounts for much of this difference.

In pigmentation, the Zuñi show the greatest contrast to the darker Papago. The Zuñi nose departs from the Papago and Yaqui pattern by its smaller size, especially narrower width and less flaring nostrils. Marked lower frequencies of thick and everted lips are shared with the Hopi and Navaho.

PAPAGO-HOPI

Like the Zuñi, the Hopi are much shorter than the Papago, but they are heavier-set. Despite their considerable inferiority in stature, their hip breadth exceeds the Papago and their chest diameters are nearly as great. This excess in lateral diameters also occurs in the cranial characteristics. Their heads are relatively broader and lower; their faces are wider; and they have broader noses.

The morphological traits that distinguish the Hopi from the Papago are similar to the Zuñi differences, that is, lighter skin, smaller and less flaring noses, and thinner lips.

PAPAGO-NAVAHO

The Navaho are somewhat taller than the Papago but they are a good deal lighter in weight. They also exceed the Papago in span, shoulder breadth, and hip width as far as absolute values are concerned; relative to stature they are less broad of body. Their chest diameters describe them as less thick-set as well as shallower-chested. They are superior to the Papago in head circumference. Relative to head length their heads are broader and higher. Face width is likewise greater.

Qualitative differences ally the Navaho with the Pueblo tribes against the Papago. Their skins are lighter, their noses smaller, lips thinner. The Navaho show an interesting superior soundness of teeth over the Papago.

GEOGRAPHICAL CONSIDERATIONS

There is an interesting geographical trend involved in some of the differences indicated by these various comparisons. The Yaqui, who are the southernmost group, have the darkest skin color. Their heads are the narrowest and, excepting the Papago, the longest. Narrow sloping foreheads, with pronounced brow ridges, are more common to the Yaqui. They

possess distinctively wide jaws, narrow faces, and their nostrils are characteristically flaring. Eversion and pronounced thickness of the lips further mark their faces. Their bodies are relatively the most long-legged, their shoulders the narrowest, and their chests the deepest. It may be significant that most of these characters which give the Yaqui individuality are variations away from the Mongoloid complex. They are departures in a non-Mongoloid direction.

The Papago, who adjoin the Yaqui to the north, share with the Yaqui more of these so-called non-Mongoloid characteristics than any of the other tribes. Especially is this true in regards darker skin color, lower cranial indices, more face hair, flaring nostrils, and thicker lips. Their relatively narrower faces, longer legs, and narrower shoulders are also cases in point. In some of these characters they are intermediate between the Yaqui and the Pueblo groups.

Thus, as one proceeds from the Pueblo country, through Papagueria, to the home of the Yaqui, there is a significant increase in non-Mongoloid physical traits. Whether or not this southward trend ends with the Yaqui is unknown as yet. Certainly it ends with the central plateau people of Mexico, those associated with the complex civilizations around the Valley of Mexico. Among these Nahuatl-speaking and related groups there is a return to smaller body size, more broad-headedness, less rugged features, narrower noses, and less flaring nostrils.

RACIAL CONSIDERATIONS

The presence of the physical variations presented above and the nature of their distribution may bear upon some of the existing problems of pre-historic racial history in North America. The data emphasize the presence among all of the South-western tribes of several traits that are Indian but are not Mongolian, a condition that has been demonstrated by others. The geographical distribution has further implication.

Dixon was of the opinion that a more dolichocephalic, broad-nosed, and generally less Mongoloid type of human was the earlier in America, and he suggested that they were succeeded by more Mongoloid groups.³ Hooton agrees that the

³ Dixon, *The Racial History of Man*.

earliest American Indians were a possible "blend of Mediterranean, Negroid, and an Archaic white element, subsequently glossed over with Mongoloid traits."⁴ Hooton also points to some of the more remote areas of America as refuge spots where earlier strains of Indians have persisted with less Mongolization.⁵

A similar explanation can be advanced to explain some of the tribal differences that exist in the Southwest, particularly the greater intensity of non-Mongoloid traits exhibited by the Papago and Yaqui. It has been pointed out earlier in this paper that the historic Papago have remained relatively unmolested because their habitat offered so little to be coveted by either Indian or White neighbors. Similarly, in earlier times, if a less Mongoloid people occupied the Southwest, later immigrants, with different combinations of physical features, would tend to avoid this less congenial part of the country and consequently leave less physical imprint of their presence. Such later Mongoloids would have skirted the desert areas of the northwestern Sonoran province and proceeded southward along the plateau.

PRESENT POSITION OF THE PAPAGO

The place of the Papago in the general anthropological setting of the Southwest can now be tentatively assigned. Geographically they are intermediate between the southern lowland Cáhita-speaking tribes, which include the Yaqui, and the Pueblo and Athapascan groups to the northeast. Papago speech affiliations place them closer to the Sonoran Uto-Aztecan tribes than to the peoples of the north.⁶ Culturally they show considerably more resemblance to Uto-Aztecan groups than to any other neighboring complex.⁷ By their greater retention of earlier racial elements they share with the Yaqui a distinctive physical position.

The physical position of the Papago as presented here adds some argument to the antiquity of the tribe in its present habi-

⁴ Hooton, *Racial Types in America*, p. 161.

⁵ *Idem*, p. 154.

⁶ Kroeber, *Cultural and Natural Areas of Native North America*, p. 39.

⁷ Underhill, *The Social Organization of the Papago Indians*, p. 270.

tat. If the Papago show more earlier physical characters because they represent descendants of a refuge group, they must have lived where they now are for a very long time. It has been pointed out that there are indications from archaeology that this is so; that the Papago are continuous with the prehistoric inhabitants of Papagueria. Sayles has demonstrated an unbroken sequence of cultures between late Cochise and early Mogollon in southeastern Arizona.⁸ The identifying traits of earliest Mogollon are very much like those of the first Hohokam phases, and for this reason Gladwin suggested several years ago a common origin for the two cultures.⁹

In the light of present information, the Southwest was first peopled by a gathering and hunting population who in appearance were not as Mongoloid as their successors. Later, at a time comparable with the end of the Basketmaker period in the north, there were infiltrations of more Mongoloid peoples who gradually dominated the earlier physical type. The southwestern part of the Southwest, the habitat of the modern Papago, was less affected by this infusion because adverse environmental factors operated then as they have in historic times to discourage newcomers. Therefore, the Papago represent a closer approximation to the earliest people in the Southwest than do the generality of its inhabitants.

⁸ Sayles and Antevs, *The Cochise Culture*.

⁹ Gladwin, *Excavations at Snaketown: II*, p. 111.

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A



B



C

PAPAGO PHYSICAL TYPES

- A: Stature, 1698 mm; Cephalic index, 86; Facial index, 93; Nasal index, 67.
B: Stature, 1822 mm; Cephalic index, 83; Facial index, 90; Nasal index, 71.
C: Stature, 1647 mm; Cephalic index, 79; Facial index, 97; Nasal index, 66.



D



E



F

PAPAGO PHYSICAL TYPES

D: Stature, 1676 mm; Cephalic index, 81; Facial index, 91; Nasal index, 66.

E: Stature, 1666 mm; Facial index, 89.

F: Stature, 1786 mm; Cephalic index, 76; Facial index, 101; Nasal index, 64.



G



H



I

PAPAGO PHYSICAL TYPES

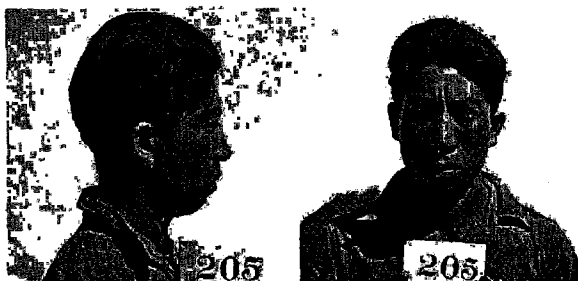
- G: Stature, 1712 mm; Cephalic index, 78; Facial index, 96; Nasal index, 63.
H: Stature, 1676 mm; Cephalic index, 84; Facial index, 93; Nasal index, 71.
I: Stature, 1654 mm; Cephalic index, 79; Facial index, 86; Nasal index, 70.



J



K



L

PAPAGO PHYSICAL TYPES

- J: Stature, 1623 mm; Cephalic index, 76; Facial index, 97; Nasal index, 66.
K: Stature, 1620 mm; Cephalic index, 80; Facial index, 89; Nasal index, 70.
L: Stature, 1627 mm; Cephalic index, 82; Facial index, 92; Nasal index, 65.



M



N

PAPAGO PHYSICAL TYPES

M: Stature, 1625 mm; Cephalic index, 75; Facial index, 97; Nasal index, 73.
N: Stature, 1585 mm; Cephalic index, 81; Facial index, 98; Nasal index, 65.

